



© Electrolux Home Products Italy S.p.A. Publication number
Corso Lino Zanussi, 30
I - 33080 Porcia – PN -
Fax: + 39 0434 394096
SOE
Edition: 07-2012 Rev 0.0

599 75 60-77

EN

***INVERTER
SPLIT SYSTEM
AIR CONDITIONER***

***MODEL:
EXH09HL1W
EXH12HL1W***

Index

1. **Safety Precautions:** refer to Page 3.
2. **ESD Requirements:** refer to Pages 4 & 5.
3. **Specifications:** refer to Pages 6 to 7.
4. **Component Overview:** refer to Pages 8 & 9.
5. **Dimention:** refer to Pages 10 & 11.
6. **Installation Brief:** refer to Pages 12 to 15
7. **Electrical Functions:** refer to Pages 16 to 23.
8. **Schematic Diagram:** refer to Pages 24 to 27.
9. **Troubleshooting:** refer to Pages 28 to 52.
10. **Disassembly Precedure:** refer to Pages 53 to 60.

1. Safe Electrical Working Practices:

- Isolate Power Before Attempting to Service any Appliance.
- Remove Power cord, Fuse or Switch off the Circuit Breaker.
- Always check appliance with multimeter to ensure the power is disconnected.
- If you have to work on a live appliance all precautions must be taken.
- ★ Use only Insulated tools and equipment.
- ★ Wear insulated shoes.
- ★ No water on the floor or working space.
- ★ Reduce the amount of exposed skin, by covering your arms and legs.
- ★ Remove jewelry (rings, watches etc).
- ★ It is essential that you conform to all local "Working Live" and "Risk Management" statutory requirements.

Duty of Care:

The Appliance Must Be Electrically and Mechanically Safe To Use

- Always check appliance with Megga to before reconnecting the power supply.

2. ESD Requirements

UNDERSTAND ELECTROSTATIC DISCHARGE

DEFINITION

Electro Static Discharge is defined as the transfer of Electro Static Charges between bodies at different potential caused by direct contact or induced electro static field. The human body can build up static charges that range up to 25,000 volts. Human perceptions of ESD are:

- At 3000 volts, you can feel it.
- At 5000 volts, you can hear it
- At 10000 volts, you can see it.



FEW FACTORS

- **Typical static charge generators:** Work surfaces, Floors, Chairs, Clothing, Papers and work order holders, Packaging materials and Personnel. Less than 30 volts of static electricity can damage a computer component.
- **ESD sensitivity increase:** Same as the product from other sectors, electronic technology has advanced rapidly. As electronic devices / components become faster and smaller, their sensitivity of ESD also increases.



SHOCKING TRUE



Unfortunately, ESD damage is not generally visible as it occurs and may be latent or not show up in functional testing of electronic devices. ESD damage leads to premature or intermittent failure. Still up to today, people remains as one of the main offender contributing the most in destroying the sensitive electronic chips used in electronic PCBs via ElectroStatic Charge.

THE KEY OF ESD CONTROL

The key of ESD control elements comprising most work place are a static dissipative work area, a means of grounding personnel (usually a wrist strap) and workstation, a common grounding connection, anti static packaging, appropriate signage and labelling, and education. The ESD Protected Work Station / Area provide a means for connecting all work surfaces, fixtures, handling equipment, and grounding devices to a common point ground.

ELECTROSTATIC DISCHARGE SENSITIVE ITEM - ESDS item

- Any Electronic circuit boards could be classified as an ESDS item.
- ESDS items are most likely packed with anti static packaging material.
- Sometimes they have an ESD warning label on the box / bag.
- Sample of ESD warning signs are shown on the right.



Three MUST

1. MUST wear an ESD equipment when handling ESDS items.
2. MUST carry a Mobile ESD workstation when attending a service call.
3. MUST handle all ESDS item in an ElectroStatic Area.



STATIC CONTROL IS NOT AN OPTION, IT IS AN ESSENTIAL

WHEN WORKING WITH ESD SENSITIVE ITEMS IN FIELD SERVICE



It is important to note that personnel safety is vital. In NO way should an ESD control program replace or supersede any requirements for personnel safety. This guidance is only for someone wearing an ESD wrist strap with 1 mega ohm inline resistor and working on equipment with operating voltage NOT exceeding 250V.

HOW TO

1. In Case You Have ONLY An ESD Wrist Strap

- Put the ESD wrist on your arm.
- Ensure wrist band fits firmly attached to our arm.
- Connect the wrist strap to the grounding point.

2. In Case You Have A Mobile ESD Working Station

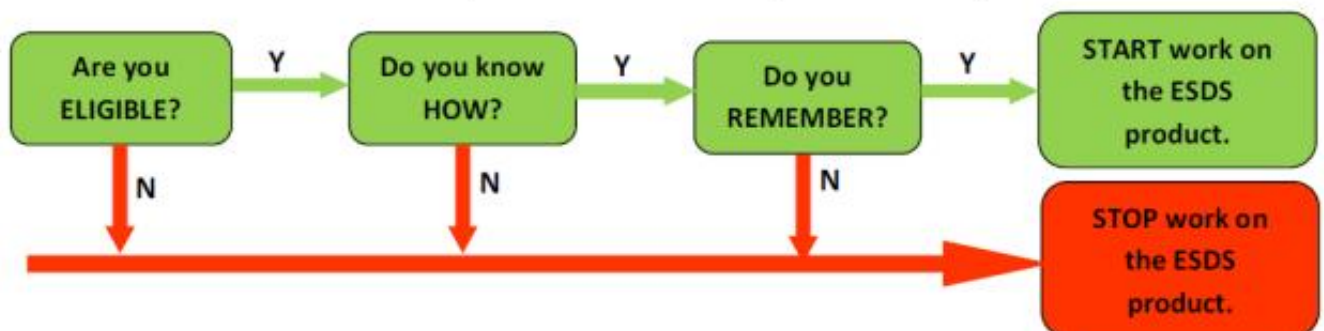
- Open Static Dissipative Mat on flat stable surface near a grounding point.
- Connect the Static Dissipative Mat to the grounding point with the supplied earth wire.
- Put the ESD wrist on your arm, ensure wrist band fits firmly.
- Connect the wrist strap to the grounding point.
- Put the ESD sign up if available.

Note: Follow the instruction from the EPA kit's manufacturer if supplied.



REMEMBER

- Always wear the ESD equipment.
- Handle all ESDS item in the Mobile ElectroStatic Area.
- Never touch or work on any ESDS items without wearing the ESD wrist strap.
- Keep the ESDS part in an ESD bag until you are ready to use it.
- Do not place any ESDS parts on the machine cover
- Ensure there is no one next to you who is NOT wearing ESD wrist strap.



3. Specifications

Parameter		Unit	Value	Value
Model			EXH09HL1W	EXH12HL1W
Power Supply	Rated Voltage	V~	220-240	220-240
	Rated Frequency	Hz	50	50
	Phases		1	1
Power Supply Mode			Indoor	Indoor
Cooling Capacity (Min~Max)		W	2500 (700~4400)	3500 (700~4500)
Heating Capacity (Min~Max)		W	2600 (720~4200)	4000 (720~4800)
Cooling Power Input (Min~Max)		W	485 (170~1350)	823 (150~1450)
Heating Power Input (Min~Max)		W	500 (182~1300)	952 (190~1500)
Cooling Power Current		A	2.10	3.60
Heating Power Current		A	2.20	4.10
Rated Input		W	1400	1700
Rated Current		A	6.20	7.5
Air Flow Volume((SH/H/MH/M/L/ML/SL)		m ³ /h	770/670/610/530/460/410/380	770/670/610/530/460/410/380
Dehumidifying Volume		L/h	0.8	1.4
EER		W/W	5.15	4.25
COP		W/W	5.20	4.20
SEER		W/W	-	-
HSPF		W/W	-	-
Application Area		m ²	12~18	16~24
Indoor Unit	Model of indoor unit		EXH09HL1WI	EXH12HL1WI
	Fan Type		Cross-flow	Cross-flow
	Diameter Length(DXL)	mm	Φ98X662	Φ98X662
	Fan Motor Cooling Speed (SH/H/MH/M/L/ML/SL)	r/min	1350/1070/1000/900/800/700/500	1350/1070/1000/900/800/700/500
	Fan Motor Heating Speed (SH/H/MH/M/L/ML/SL)	r/min	1350/1150/1080/1030/980/900/850	1350/1150/1080/1030/980/900/850
	Output of Fan Motor	W	15	15
	Fan Motor RLA	A	0.07	0.07
	Fan Motor Capacitor	μF	-	-
	Input of Heater	W	-	-
	Evaporator Form		Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
	Pipe Diameter	mm	Φ7	Φ7
	Row-fin Gap	mm	2-1.5	2-1.5
	Coil Length (LXDXW)	mm	662X25.4X305	662X25.4X305
	Swing Motor Model		MP24HA/MP24HB/MP24HC	MP24HA/MP24HB/MP24HC
	Output of Swing Motor	W	2.4/2.4/2.4	2.4/2.4/2.4
	Fuse	A	PCB 3.15A	PCB 3.15A
	Sound Pressure Level (SH/H/MH/M/L/ML/SL)	dB (A)	43/36/34/32/28/24/22	43/36/34/32/28/24/22
	Sound Power Level (SH/H/MH/M/L/ML/SL)	dB (A)	55/48/46/44/40/36/34	55/48/46/44/40/36/34
	Dimension (WXHxD)	mm	896X316X205	896X316X205
	Dimension of Carton Box (LXWXH)	mm	950X385X280	950X385X280
	Dimension of Package (LXWXH)	mm	953X388X295	953X388X295
	Net Weight	kg	12.0	12.0
	Gross Weight	kg	14.0	14.0

Outdoor Unit	Model of Outdoor Unit		EXH09HL1WE	EXH12HL1WE
	Compressor Manufacturer/Trademark		CHINA RESOURCES(SHENYANG) SANYO COMPRESSOR CO. LTD	CHINA RESOURCES(SHENYANG) SANYO COMPRESSOR CO. LTD
	Compressor Model		C-6RZ110H1A	C-6RZ110H1A
	Compressor Oil		FV50S	FV50S
	Compressor Type		Rotary	Rotary
	L.R.A.	A	33	33
	Compressor RLA	A	4.59	4.59
	Compressor Power Input	W	800	800
	Overload Protector		1nt11I-3979	1nt11I-3979
	Throttling Method		Electron expansion valve	Electron expansion valve
	Operation temp	°C	16~30	16~30

	Ambient temp (cooling)	°C	16~48	16~48
	Ambient temp (heating)	°C	-20~+24	-20~+24
	Condenser Form		Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
	Pipe Diameter	mm	Φ7.94	Φ7.94
	Rows-fin Gap	mm	2.5-1.5	2.5-1.5
	Coil Length (LXD _X W)	mm	762X57X550	762X57X550
	Fan Motor Speed	rpm	750/600	750/600
	Output of Fan Motor	W	40	40
	Fan Motor RLA	A	0.23	0.23
	Fan Motor Capacitor	μF	-	-
	Air Flow Volume of Outdoor Unit	m ³ /h	2000	2000
	Fan Type		Axial-flow	Axial-flow
	Fan Diameter	mm	Φ445	Φ445
	Defrosting Method		Automatic Defrosting	Automatic Defrosting
	Climate Type		T1	T1
	Isolation		I	I
	Moisture Protection		IP24	IP24
	Permissible Excessive Operating Pressure for the Discharge Side	MPa	4.3	4.3
	Permissible Excessive Operating Pressure for the Suction Side	MPa	2.5	2.5
	Sound Pressure Level (H/M/L)	dB (A)	51/-/-	52/-/-
	Sound Power Level (H/M/L)	dB (A)	63/-/-	64/-/-
	Dimension (WXHXD)	mm	818X596X300	818X596X300
	Dimension of Carton Box (LXWXH)	mm	945X417X630	945X417X630
	Dimension of Package (LXWXH)	mm	948X420X645	948X420X645
	Net Weight	kg	43	43
	Gross Weight	kg	48	48
	Refrigerant		R410A	R410A
	Refrigerant Charge	kg	1.3	1.3
Connection Pipe	Length	m	5	5
	Gas Additional Charge	g/m	20	20
	Outer Diameter Liquid Pipe	mm	Φ6	Φ6
	Outer Diameter Gas Pipe	mm	Φ9.52	Φ9.52
	Max Distance Height	m	10	10
	Max Distance Length	m	20	20

4.Component Overview

(1)Power cord

(2)Remote controller

(3)Front panel

(4)Fitter

(5)Horizontal louver

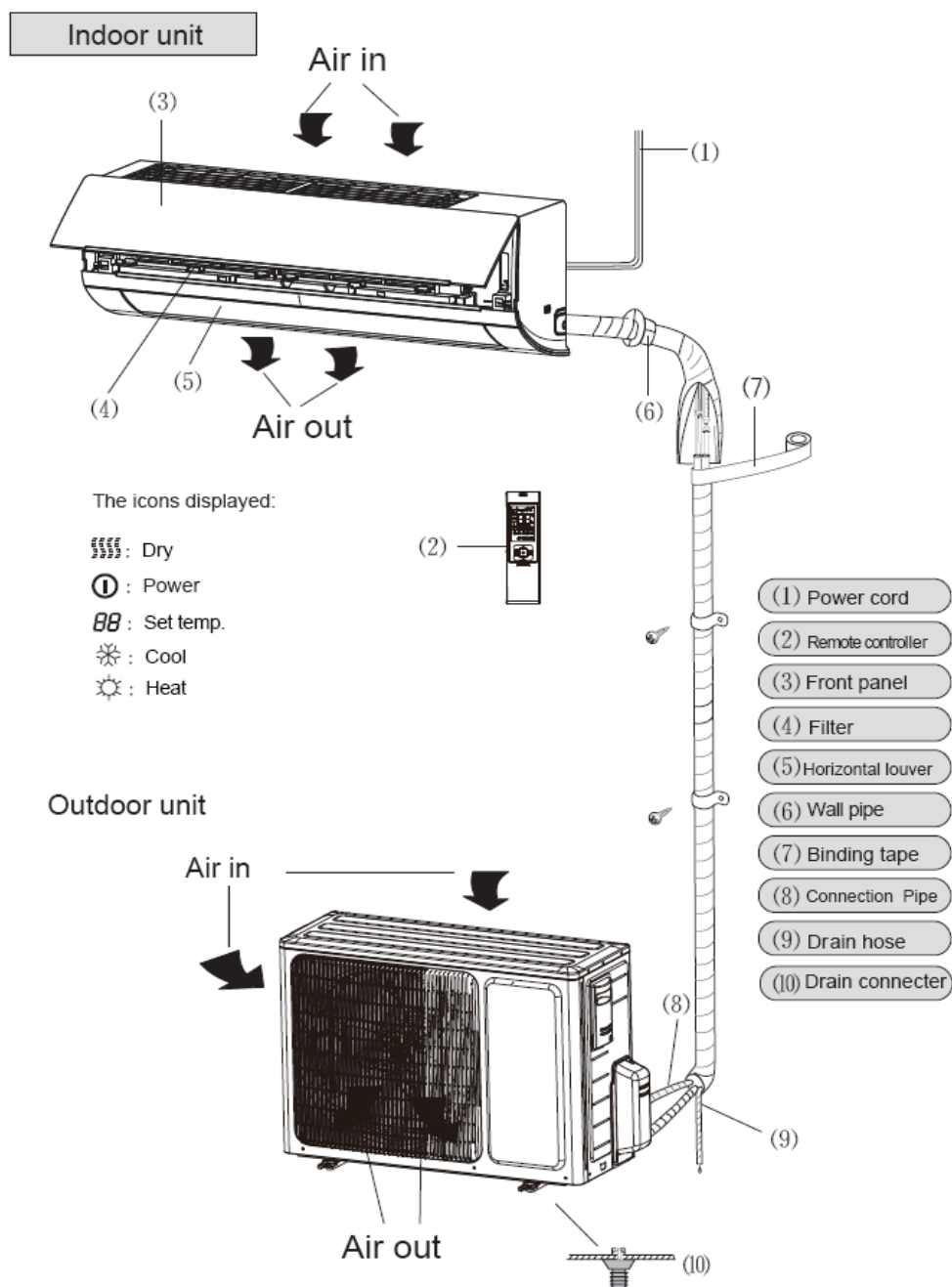
(6)Wall pipe

(7)Binding tape

(8)Connection pipe

(9)Drain hose

(10)Drain connecter



Display Panel(indoor unit)

(10)Heating indicator:

This indicator illuminates when the air conditioner is in HEAT mode.

(11)Cooling indicator:

This indicator illuminates when the air conditioner is in COOL mode

(12)LED indicator

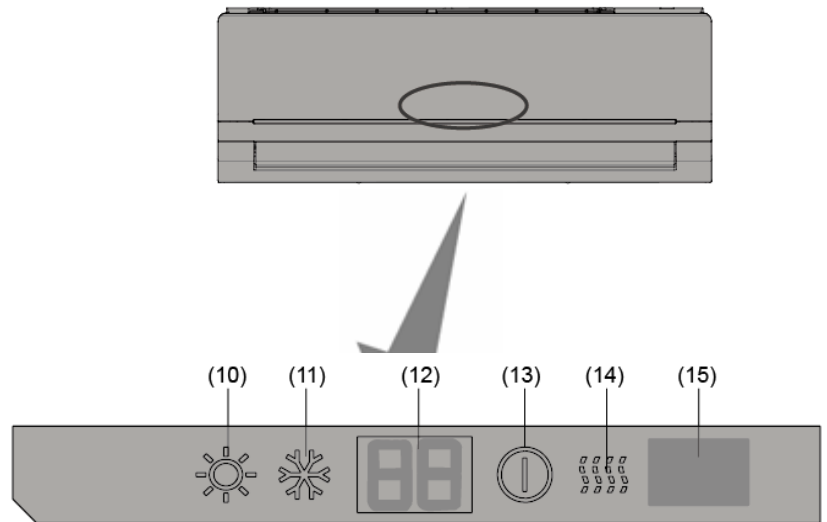
(13)Power indicator:

This indicator illuminates when the air conditioner is connected to the power supply.

(14)Drying indicator:

This indicator illuminates when the air conditioner is in DRY mode

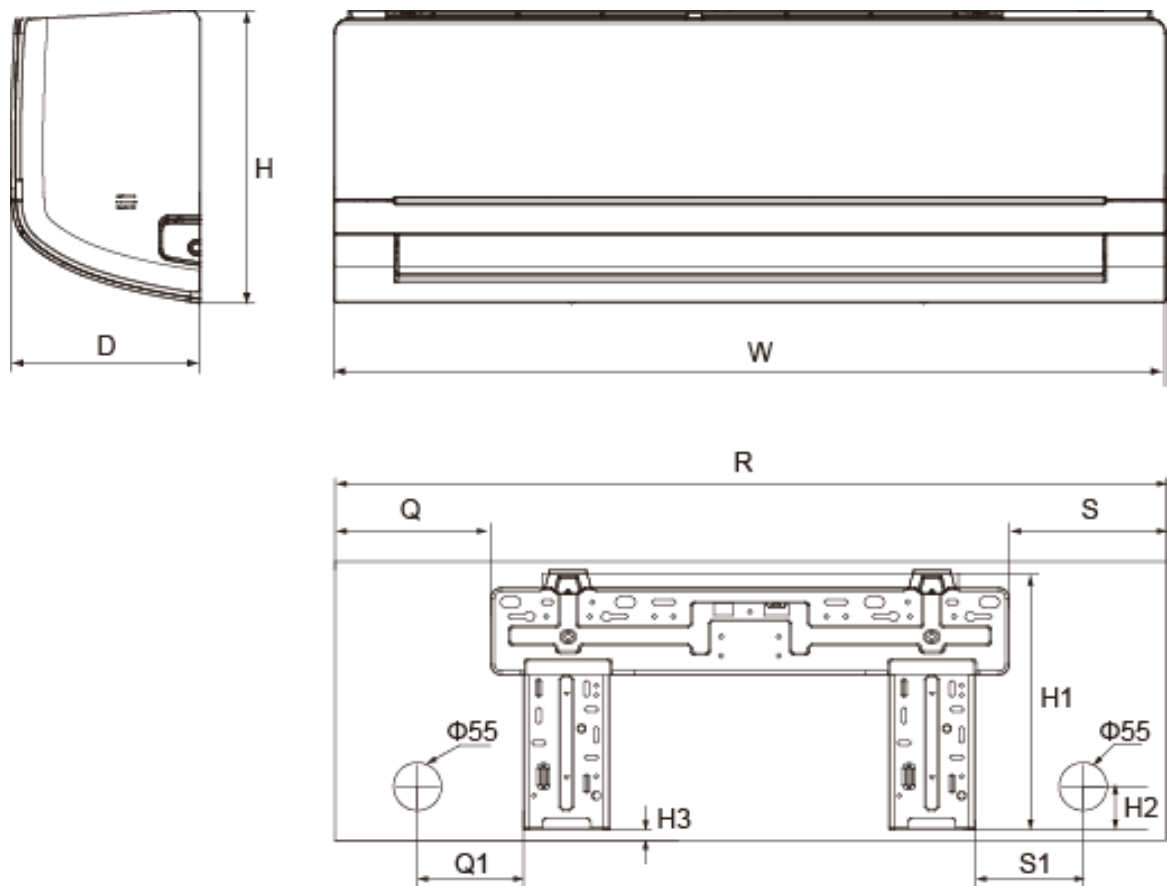
(15)Infrared signal receiver



Note: Any of the above-mentioned indicators will illuminate only when the LIGHT function is activated By the remote control.

5. Dimensions

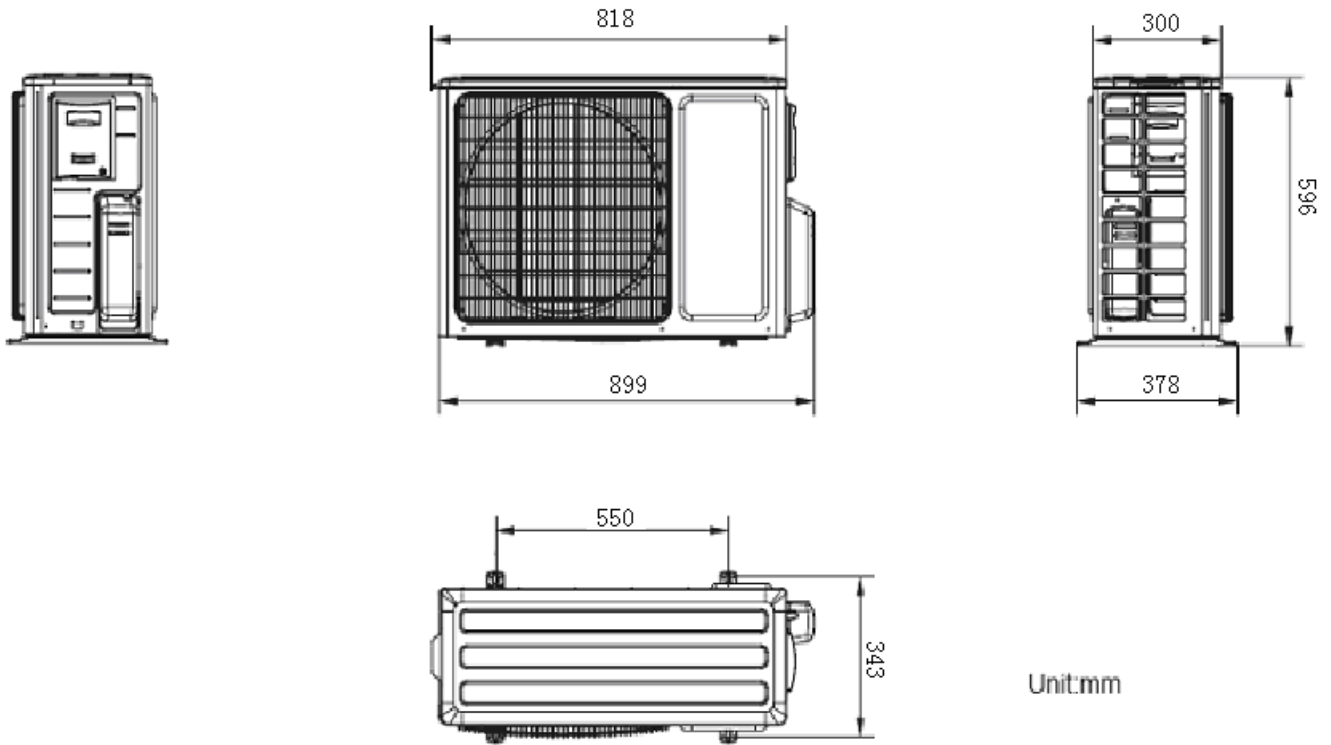
Indoor Unit



Unit: mm

Models	W(R)	D	H	H1	H2	H3	Q	Q1	S	S1
EXH09HL1W EXH12HL1W	896	205	316	267	35	34.5	177	160	178	80

EXH09HL1W (outdoor) & EXH12HL1W(outdoor)

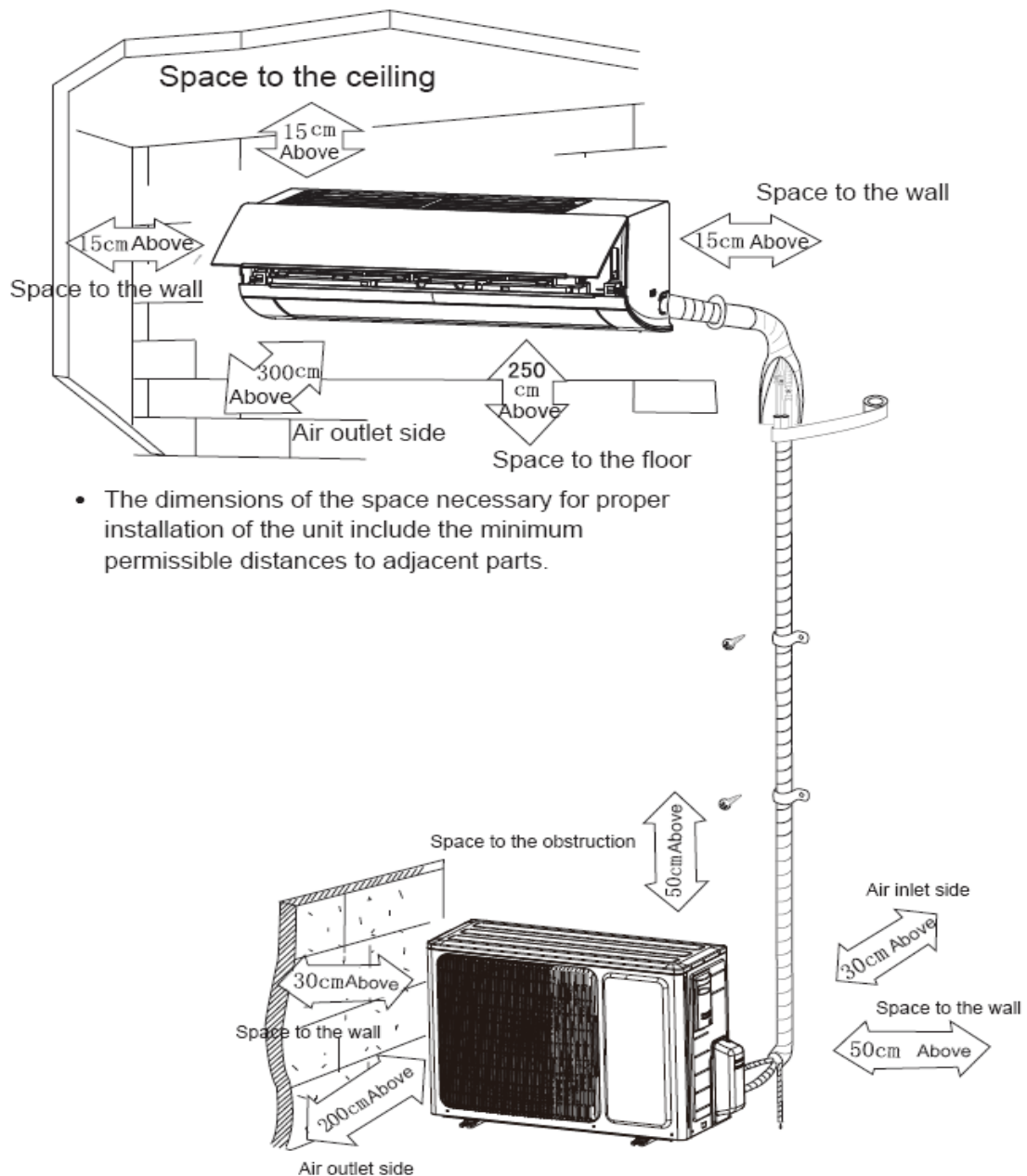


6. Installation Brief

Operating Temperatures:

Cooling & Heating models

MODE					
Cool		Heat		Dehumidifier	
Temperature		Temperature		Temperature	
Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
16°C~30°C	16°C~48°C	16°C~30°C	-20°C~24°C	16°C~30°C	16°C~48°C



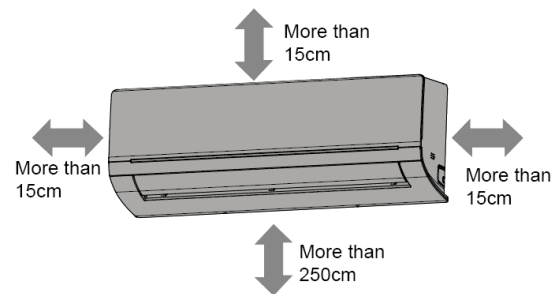
Installation Site Instructions

Proper installation site is vital for correct and efficient operation of the unit. Avoid the following sites where:

- strong heat sources, vapours, flammable gas or volatile liquids are emitted.
- high-frequency electro-magnetic waves are generated by radio equipment,
- welders and medical equipment.
- salt-laden air prevails (such as close to coastal areas).
- the air is contaminated with industrial vapours and oils.
- the air contains sulphures gas such as in hot spring zones.
- corrosion or poor air quality exists.

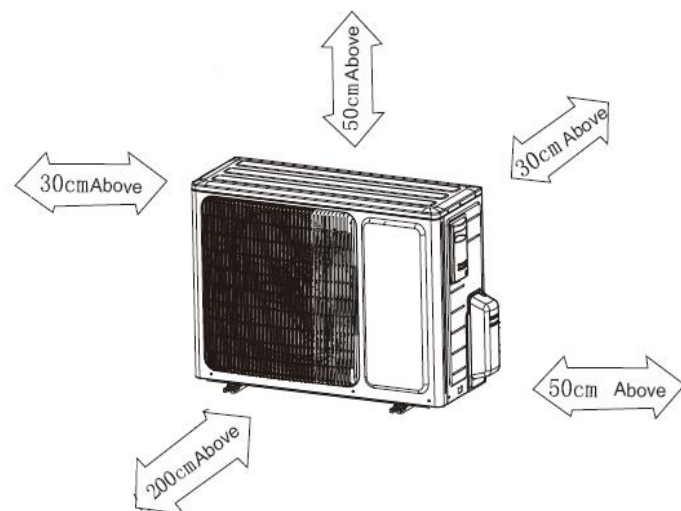
Installation Site of Indoor Unit

1. The air inlet and outlet should be away from the obstructions.
Ensure the air can be blown through the whole room.
2. Select a site where the condensing water can be easily drained out, and where it is easily connected for outdoor unit.
3. Select a place where it is out of reach of children.
4. Select the place where the wall is strong enough to withstand the full weight and vibration of the unit.
5. Be sure to leave enough space to allow access for routine maintenance. The installation site should be 250cm or more above the floor.
6. Select a place about 1m or more away from TV set or any other electric appliance.
7. Select a place where the filter can be easily taken out.
8. Make sure that the indoor unit is installed in accordance with installation dimension instructions.
9. Do not use the unit in the laundry or by swimming pool etc.



Installation Site of Outdoor Unit

1. Select a site where noise and outflow air emitted by unit will not annoy neighbors.
2. Select a site where there is sufficient ventilation.
3. Select a site where there is no obstruction blocking the inlet and outlet.
4. The site should be able to withstand the full weight and vibration.
5. Select a dry place, but do not expose the unit to direct sunlight or strong wind.
6. Make sure that the outdoor unit is installed in accordance with the installation instructions, and is convenient for maintenance and repair.
7. The height difference between indoor and outdoor units is within 10 m, and the length of the connecting tubing does not exceed 20 m.
8. Select a place where it is out of reach of children.
9. Select a place which will not block pedestrian passage and influence the city appearance.



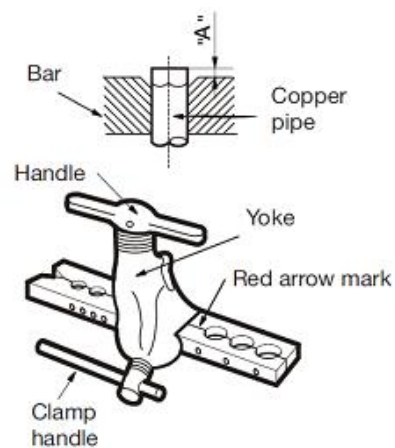
Piping Length, Elevation, Flare Work & Torque Settings

Model	Piping		Standard Length (m)	Max Elevation (m)	Max Length (m)	Additional Refrigerant (g/m)
	GAS	LIQUID				
EXH09HL1W	3/8 9.52mm	1/4 6.00mm	5	10	20	20
EXH12HL1W	3/8 9.52mm	1/4 6.00 mm	5	10	20	20

Flaring work.

Firmly hold copper pipe in a die in the dimension shown in The table below

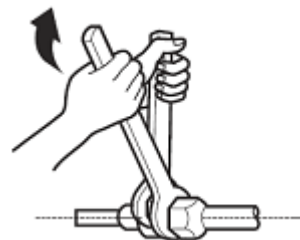
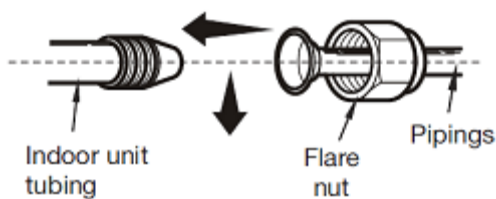
OUTER DIAMETER(mm)	A(mm)	
	Max.	Min.
6,00	1,3	0,7
9,52	1,6	1,0
12,70	1,8	1,0
16	2,4	2,2



Connection Adjustment

1. Align the pipes to be connected.
2. Screw the flare nut with your fingers, and then tighten it with a spanner and torque wrench, as shown in the following figure.

Caution: Excessive twisting may break the nut, depending on the installation conditions.



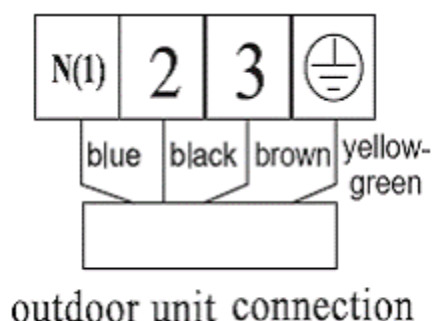
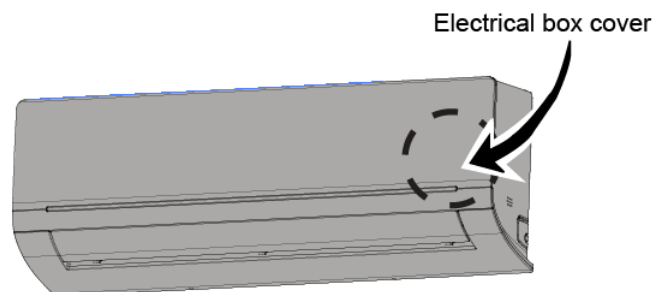
OUTER DIAMETER(mm)	TIGHTENING TORQUE(N/cm)	ADITINAL TIGHTENING TORQUE(N/cm)
6,00	1570(160 kgf/cm)	1960(200 kgf/cm)
9,52	2940(300 kgf/cm)	3430(350 kgf/cm)
12,70	4900(500 kgf/cm)	5390(550 kgf/cm)
16	6000(611 kgf/cm)	6500(663 kgf/cm)

Electrical Work:

CAPACITY	POWER SUPPLY	INPUT RATED AMP Switch/Fuse	CABLE SIZE
EXH09HL1W EXH12HL1W	220-240V~/50Hz	16A/16A	1.5 mm ² (power cord) 1.5 mm ² (connecting cable)

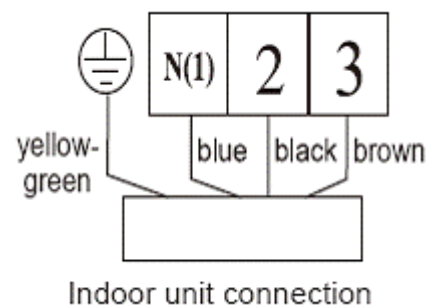
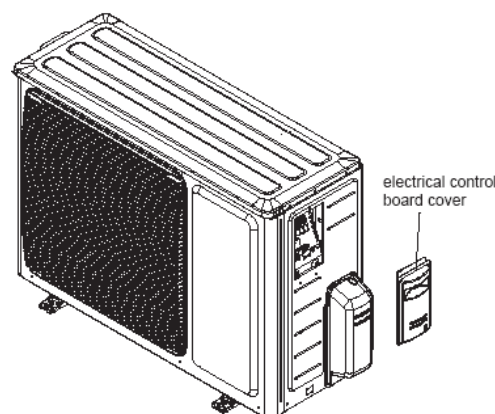
Connect the Cable to the Indoor Unit (instruction manual)

- 1.The inside and outside connecting cable can be connected without removing the front panel.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed flexible cord,type designation H07RN-F or heavier cord.
- 3.Life the indoor unit panel up,remove the electrical box cover by loosening the screw.
- 4.Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor respectively.
- 5.Wrap those cables not connected with terminals with insulation tapes,so that they will not touch any electrical components.Secure the cable onto the control board with the cord clamp.



Connect the Cable to the Outdoor Unit

- 1.Remove the electrical control board cover from the outdoor unit by loosening the screw.
- 2.Connect the connective cables to the terminals as Identified with their respective matched numbers on the terminal block of indoor and outdoor unit.The connective cable to power supply shall be approved polychloroprene sheathed flexible cord,type designation H07RN-F or heavier cord.
- 3.Securd the cable onto the control board with the cord clamp.
- 4.To prevent the ingress of water,form a loop of the connective cable as illustrated in the installation diagram of indoor and outdoor units.
- 5.Insulate unused cord(conductors) with PVC-tape.Process them so they could not touch any electrical or metal parts.



7. Electronic Function

1. Temperature Parameters

◆Indoor preset temperature (T_{preset})

◆Indoor ambient temperature ($T_{\text{amb.}}$)

2. Basic Functions (The temperature in this manual is expressed by Centigrade. If Fahrenheit is used, the switchover between them is $T_f = T_c \times 1.8 + 32$.)

Once the unit is energized, the compressor shall never be restarted except 3mins interval at least. For the first energization, if the unit is at off status before power failure, the compressor can be restarted without 3-min delay. But if the unit is at ON status before power failure, the compressor shall be restarted with 3mins delay. Once the compressor is started up, the compressor won't stop running within 6mins with the change of room temperature.

(1) Cooling Mode

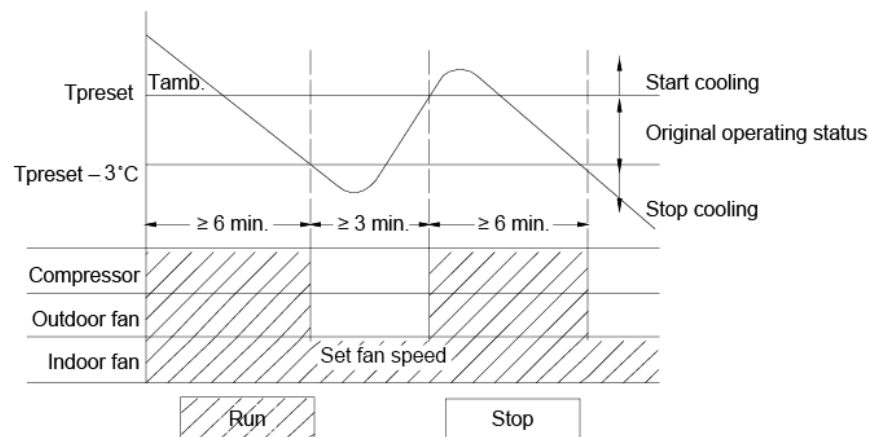
① Cooling Conditions and Process

When $T_{\text{amb.}} \geq T_{\text{preset}}$, the unit starts cooling operation. In this case, the compressor and the outdoor fan operate and the indoor fan operates at set speed.

When $T_{\text{amb.}} \leq T_{\text{preset}} - 3^\circ\text{C}$, the compressor and the outdoor fan stop while the indoor fan runs at set speed.

When $T_{\text{preset}} - 3^\circ\text{C} < T_{\text{amb.}} < T_{\text{preset}}$, the unit will maintain its previous running status.

In cooling mode, the temperature setting range is $16 \sim 30^\circ\text{C}$. Indoor unit displays operation icon, cooling icon and set temperature.



(2) Dry Mode

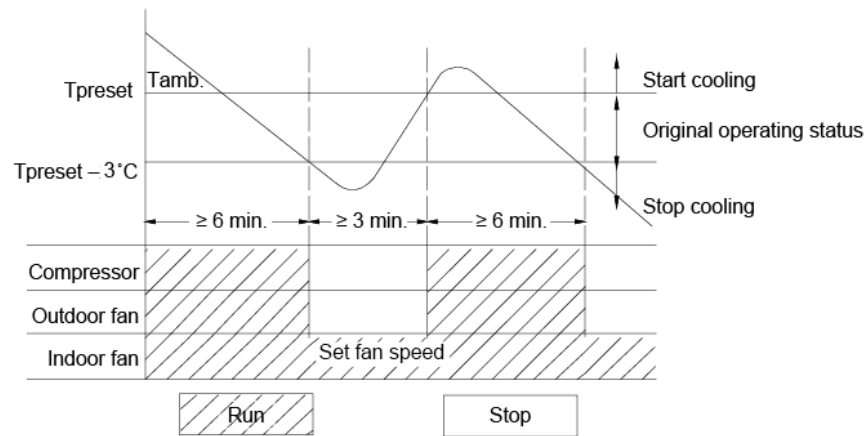
① Drying Conditions and Process

When $T_{\text{amb.}} > T_{\text{preset}}$, the unit operates in cooling mode. Meanwhile, compressor and outdoor fan operate, and indoor fan operates at set fan speed (low fan speed, quiet fan speed).

When $T_{\text{preset}} - 3^\circ\text{C} < T_{\text{amb.}} \leq T_{\text{preset}}$, the unit keeps previous operation status.

When $T_{\text{amb.}} \leq T_{\text{preset}} - 3^\circ\text{C}$, compressor, outdoor fan and indoor fan operate at set fan speed (low fan speed, quiet fan speed).

Under this mode, the temperature setting range is $16 \sim 30^\circ\text{C}$. Display displays operation icon, drying icon and set temperature.



(3) Heating Mode (this mode isn't available for cooling only unit)

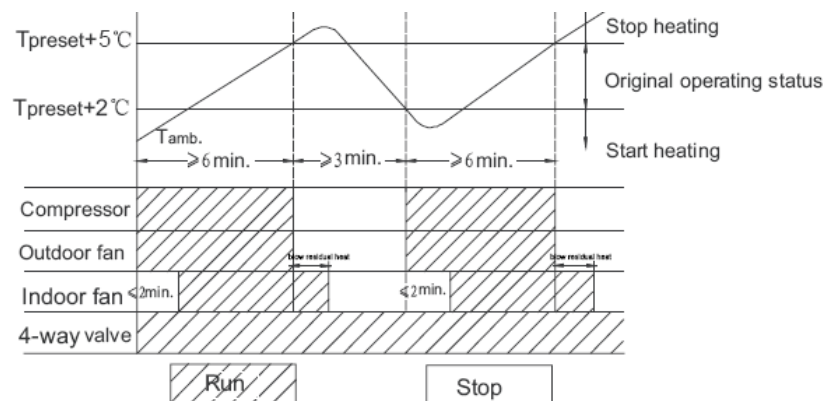
①Heating Conditions and Process

When $T_{amb.} \leq T_{preset} + 2^{\circ}\text{C}$, the unit operates in cooling mode. Compressor and outdoor fan operate and indoor fan operates according to cold air prevention.

When $T_{amb.} \geq T_{preset} + 5^{\circ}\text{C}$, compressor and outdoor fan stop operation, while indoor fan operates according to blowing residual heat.

When $T_{preset} + 2^{\circ}\text{C} < T_{amb.} < T_{preset} + 5^{\circ}\text{C}$, the unit operate at previous running status.

In heating mode, the temperature setting range is 16 ~ 30°C. Indoor unit displays operation icon, cooling icon and set temperature.



②Defrosting

When there's too much frost on outdoor condenser, the complete unit will enter into defrosting automatically to assure the best heating effect. During defrosting process, H1 is displayed.

③Blow Residual Heat

When heating temperature reaches to the temperature point of stop operation, compressor and outdoor fan will stop operation. The big horizontal louver rotates to the defaulted position in cooling and small horizontal louver will close. Indoor fan will stop operation after operating at set fan speed for 60s.

When the unit operates in heating or auto heating mode, compressor is started up and the unit will stop operation after indoor fan starts operation. Compressor and outdoor fan stop operation. The big horizontal louver will rotate to the position of breeze (defaulted position in cooling), while the small horizontal louver will close. The unit will stop operation after indoor fan operates at low fan speed for 10s.

④Cold Air Prevention

In heating mode, in order to prevent the cold air comes out when turning on the compressor, the indoor fan can only be started up after compressor operates for 2 minutes.

(4) Fan Mode

In fan mode, indoor fan operates at set fan speed, while compressor and outdoor fan all stop operation.

In fan mode, the temperature setting range is 16 ~ 30°C. Display is displaying operation icon and set temperature.

(5) Auto Mode

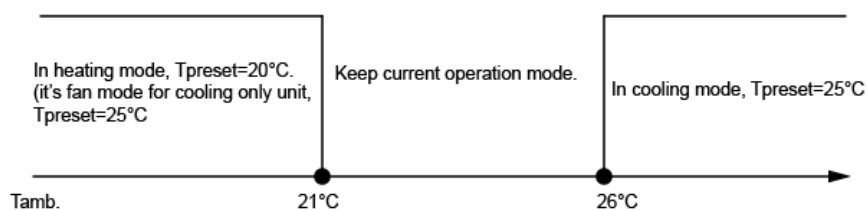
In auto mode, the system will select the operation mode (cooling, heating or fan mode) according to the change of ambient temperature automatically. The display displays operation icon, actual operation mode and set temperature. 30s will be delayed for protection during mode switchover. Protection function is the same as that in other modes.

The selection method for auto operation mode in details is as below:

- When $T_{amb.} \geq 26^{\circ}\text{C}$, the unit operates in cooling mode. The defaulted set temperature is 25°C ;
- When $T_{amb.} \leq 21^{\circ}\text{C}$, the unit operates in heating mode. The defaulted set temperature is 20°C (if it's the cooling only unit that operates in fan mode, the defaulted set temperature is 25°C);
- When $22^{\circ}\text{C} \leq T_{amb.} \leq 25^{\circ}\text{C}$, if the unit is turned on for the first time, it will operate in auto fan mode; if the unit is switched to auto mode from other mode, it will keep previous operation mode; if the unit is switched to auto mode from dry mode, it will operate in fan mode.
- When the unit operates in auto mode, frequency of compressor during cooling and heating is same as that in cooling mode and heating mode respectively.

Protection function:

- It's the same as that in cooling mode when it operates in cooling;
- It's the same as that in heating mode when it operates in heating;



(6) 8°C Heating Function

In heating mode, press IONFilter+clock buttons on remote controller simultaneously. In this mode, "cold air prevention protection" will be shielded.

① 8°C heating mode and sleep function can't be set at the same time. If 8°C heating mode has been set, press sleep button will cancel 8°C heating mode. The set temperature value is the set temperature before entering the 8°C heating mode. If sleep function has been set, press IONFilter+clock button on remote controller simultaneously to set 8°C heating mode, meanwhile, sleep function will be canceled.

② Set temperature is 8°C ; Indoor fan displays 8°C

③ In this mode, turbo function can be set and fan speed can't be adjusted as well.

④ In this mode, when compressor is operating, fan speed will be adjusted according to below auto fan speed; When compressor stops operation, indoor fan operates at blowing residual heat.

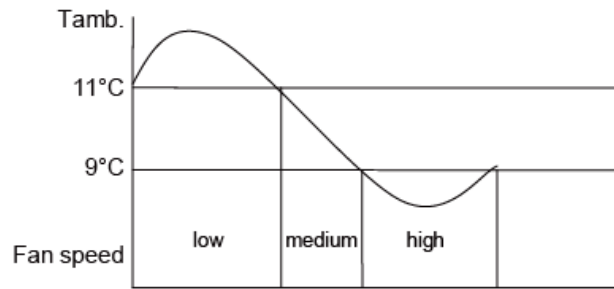
When $T_{indoor\ amb.} \leq 9^{\circ}\text{C}$, indoor fan operates at high fan speed;

When $9^{\circ}\text{C} < T_{indoor\ amb.} < 11^{\circ}\text{C}$, indoor fan operates at medium fan speed;

When $T_{indoor\ amb.} \geq 11^{\circ}\text{C}$, indoor fan operates at low fan speed;

As for the switchover among high speed, medium speed and low speed, the unit should operate at every speed for 3 minutes and 30s at least. Others are same as that in heating mode.

⑤ The unit with memory function can memorize 8°C heating mode.



(7)SAVE Function

① In cooling mode, if press IONFilter+clock buttons on remote controller simultaneously, the controller will enter into SAVE mode. In SAVE mode, if press IONFilter+clock buttons on remote controller simultaneously again, SAVE function won't be set again.

② If remote controller is set to display set temperature, dual-8 nixie tube display "SE".

③ In this mode, when compressor is operating, fan speed will be adjusted according to below auto fan speed in SAVE mode; When compressor stops operation, indoor fan operates at low fan speed.

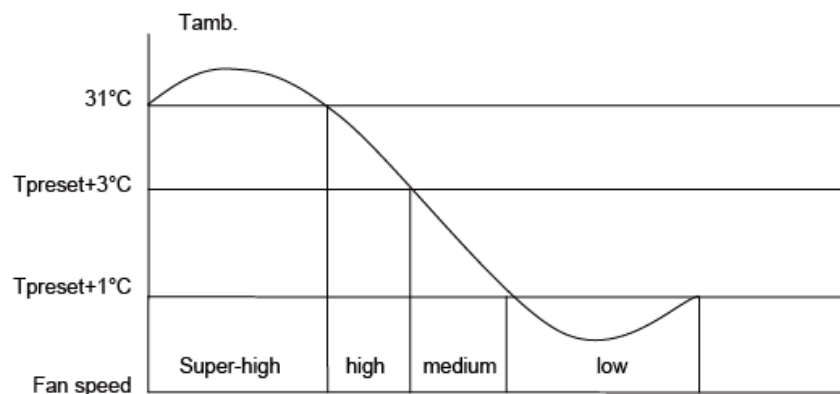
a. When $T_{amb.} \geq 31^{\circ}\text{C}$, indoor fan operates at super-high fan speed;

b. When $31^{\circ}\text{C} > T_{amb.} \geq T_{preset} + 3^{\circ}\text{C}$, indoor fan operates at high fan speed;

c. When $T_{preset} + 1^{\circ}\text{C} < T_{amb.} < T_{preset} + 3^{\circ}\text{C}$, indoor fan operates at medium fan speed;

d. When $T_{amb.} \leq T_{preset} + 1^{\circ}\text{C}$, indoor fan operates at low fan speed;

As for the switchover among super-high speed, high speed, medium speed and low speed, the unit should operate at every speed for 3minutes and 3s at least.



④ In this mode, set temperature will be adjusted automatically according to actual operation status.

3 Other Control

(1) Timer Function

General timer and clock timer functions are compatible by equipping remote controller with different functions.

①General Timer

Timer ON can be set at unit OFF. If selected ON time is reached, the unit will start to operate according to previous setting status. Time setting range is 0.5-24hr in 30-minute increments.

Timer OFF can be set at unit ON. If selected OFF time is reached, the unit will stop operation. Time setting range is 0.5-24hr in 30-minute increments.

②Clock Timer (it's optional for the remote controller with clock timer)

Timer ON

If timer ON is set during operation of the unit, the unit will continue to operate. If timer ON is set at unit OFF, upon ON time reaches the unit will start to operate according to previous setting status.

Timer OFF

If timer OFF is set at unit OFF, the system will keep standby status. If timer OFF is set at unit ON, upon OFF time reaches the unit will stop operation.

Timer Change

Although timer has been set, the unit still can be turned on/off by pressing ON/OFF button of the remote controller. You can also set the timer once again, and then the unit will operate according to the last setting.

If timer ON and timer OFF are set at the same time during operation of the unit, the unit will keep operating at current status till OFF time reaches.

If timer ON and timer OFF are set at the same time at unit OFF, the unit will keep off status till ON time reaches.

Each day in future, the system will operate according to preset mode till OFF time reaches and stop operation till ON time reaches. If ON time and OFF time are the same, OFF command takes the priority.

(2) Auto Button

If this button is pressed, the unit will operate in AUTO mode and indoor fan will operate at auto speed; meanwhile, the swing motor operates. Press this button again to turn off the unit.

(3) Buzzer

Upon energization or availably operating the unit or remote controller, the buzzer will give out a beep.

(4) Sleep Function

In SLEEP mode, the unit will automatically select appropriate sleep curve to operate according to different temperature setting.

(5) Turbo Function

This function can be set in cooling or heating mode to quickly cool or heat the room.

(6) X-fan Function

① X-fan function can be set in cooling or drying mode (X-fan function is unavailable in auto, heating or fan mode). When X-fan is ON, after pressing ON/OFF button to turn off the unit, indoor fan will still operates at low fan speed for 10 minutes before turn off the complete unit. Within 10 minutes, swing operates at original status, cold plasma and electrostatic dedusting is ON, while other loads are OFF. When X-fan is OFF, press ON/OFF button to turn off the complete unit.

② During X-fan operation, after pressing X-fan button, indoor fan stops operates immediately. Horizontal louver will close and cold plasma and electrostatic dedusting is OFF as well.

(7) Control of Indoor Fan

Indoor fan can be set at quiet, north 1, north 2, notch 3, notch 4, notch 5 and turbo. Meanwhile, the fan can operate at low speed, medium speed, high speed or turbo.

It can also set at auto fan speed. When indoor fan operates in auto fan speed mode, the indoor fan will operate at high speed, medium speed, low speed or turbo according to the change of ambient temperature.

① In auto heating mode or normal heating mode, the auto fan speed operates according to below mode:

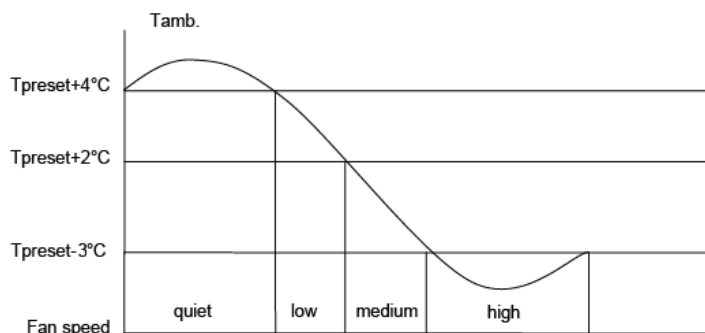
When $T_{amb.} < T_{preset} - 3^{\circ}\text{C}$, indoor fan operates at high speed;

When $T_{preset} - 3^{\circ}\text{C} \leq T_{amb.} < T_{preset} + 2^{\circ}\text{C}$, indoor fan operates at medium speed;

When $T_{preset} + 2^{\circ}\text{C} \leq T_{amb.} < T_{preset} + 4^{\circ}\text{C}$, indoor fan operates at low speed;

When $T_{amb.} \geq T_{preset} + 4^{\circ}\text{C}$, indoor fan operates at quiet mode.

Control drawing of auto fan in heating mode:



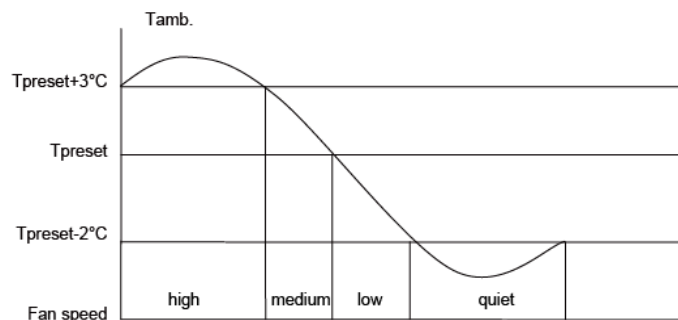
② Fan mode, cooling mode: In auto cooling mode or normal cooling mode, auto fan speed operates according to below mode:

When $T_{amb.} \geq T_{preset} + 3^{\circ}\text{C}$, indoor fan operates at high speed;

When $T_{\text{preset}} < T_{\text{amb.}} < T_{\text{preset}} + 3^{\circ}\text{C}$, indoor fan operates at medium speed;

When $T_{\text{preset}} - 2 < T_{\text{amb.}} \leq T_{\text{preset}}$, indoor fan operates at low fan speed;

When $T_{\text{amb.}} \leq T_{\text{preset}} - 2^{\circ}\text{C}$, indoor fan operates at quiet mode.



③Auto fan speed is not available in drying mode

Note: high speed, medium speed and low speed is to "notch 5", "notch 3" and "notch 1" respectively.

As for the switchover among high speed, medium speed and low speed, the unit should operate at every speed for 3 minutes and 3s at least.

(8) Control of Up&Down Swing

a. Small Horizontal Louver

After energization, small swing motor will firstly have the horizontal louver rotate anticlockwise to position 0 to close air outlet.

If swing function has not been set after startup of the unit, horizontal louver will turn clockwise to position D1 in HEAT mode. If swing function is set when starting up the unit, the horizontal louver will swing between 0 and D1.

There are 7 swing status of horizontal louver: Positions O, A1, B1, C1, D1, swing between O and D1 and stop at any position between O and D1 (angles between O and D1 are equiangular mostly). In other statuses, horizontal louver will close at position O.

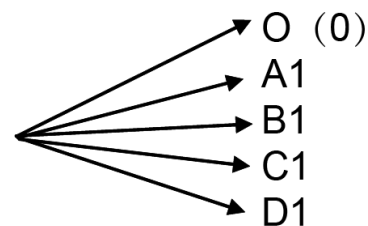
Upon turning off the unit, the horizontal louver will close at position 0.

Swing is valid only when swing command is set and indoor fan operates.

Note:1. If the position is set between O and D1, A1 and C1 or B1 and D1 by remote controller, the horizontal louver will swing between O and D1.

2. As for 9k/12k, only when the big horizontal louver rotates to the second swing angle position in heating (corresponding angle is 62°), the horizontal louver will start action. As for 18k, only when the big horizontal louver rotates to the first swing angle position in heating (corresponding angle is 64°), the horizontal louver will start action. As for 24k, only when the big horizontal louver rotates to the first swing angle position in heating (corresponding angle is 40°), the horizontal louver start action.

3. In cooling mode, the horizontal louver stops at position O all the time.



b. Big Horizontal Louver

After energization, up & down swing motor will firstly have the horizontal louver rotate anticlockwise to position 0 to close air outlet.

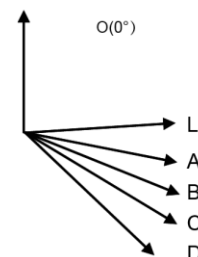
If swing function has not been set after startup of the unit, horizontal louver will turn clockwise to position D in HEAT mode, or turn clockwise to level position L in other modes.

If swing function is set when starting up the unit, the horizontal louver will swing between L and D.

There are 7 swing status of horizontal louver: Positions L, A, B, C and D, swing between L and D and stop at any position between L and D (angles between L and D are equiangular).

Upon turning off the unit, the horizontal louver will close at position 0.

Note:1) If the position is set between L and B, A and C or B and D by remote controller, the horizontal louver will swing between L and D.

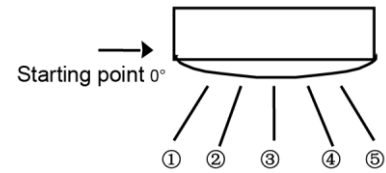


(9) Control of Left&Right Swing

After energization, swing will be restored to the starting point firstly and then stop at the middle position. When setting left&right swing, swing blade has 7 statuses: left position ① secondary left position ② middle position ③ secondary right position ④ right position ⑤ swing between ① and ⑤ stop position. If left&right swing is set when turning on the unit, swing motor will drive blade to swing between left and right.

When cancel left&right swing or swing hasn't been set when turning on the unit for the first time, blade will stop at current position. Left&right swing will keep at original position when turning off the unit.

Swing is valid only when swing command is set and indoor fan operates.



(10) Display

① Operation and Mode Icons

Upon energization within 3s, the unit will display all icons. Under standby state, running indicating mark is displayed. If the unit is started by remote controller, running indicating mark gives off light; meanwhile, the mark of current running mode will be displayed. If the light button is turned off, no mark will be displayed.

② Display of Nixie Tube on Indoor Unit

When energized & started for the first time, the indoor unit defaults to displaying current set temperature (16 ~ 30°C). When set temperature display is set by remote controller, it will display set temperature; when room temperature display is set, it will display room temperature. After that, when operating the remote controller for other settings, the temperature display method will keep original.

When operating the remote controller during room temperature display, the set temperature will be displayed for 5 seconds firstly and then room temperature display returns.

"F1" will be displayed upon malfunction of room temperature sensor, "F2" upon malfunction of indoor unit tube temperature sensor and "C5" upon malfunction of jumper cap.

(11) Memory Function

Memorized items: mode, up & down swing, light, set temperature and set fan speed.

When power is recovered after power failure, the unit will automatically start operation according to memorized status. After power recovery, the unit without timer setting before power failure will operate according to the last setting; the unit with general timer setting which has not been fulfilled before power failure will memorize the timer setting and re-calculate the time after power recovery. If there is timer function in the last remote controller command but setting time has reached, the system will act as timer on/off setting before power failure. After power failure, the system memorizes the operation states before power failure without timer action. Clock timer can not be memorized.

(12) I FEEL Function

When I FEEL command is received and controller has received the ambient temperature sent by remote controller, the controller will operate at the temperature sent by remote controller (For cold air prevention, the unit operates according to the ambient temperature sensed by the air conditioner). If it only received I FEEL command and hasn't received the valid ambient temperature, air conditioner will operate according to the ambient temperature sensed by itself. Remote controller will send the ambient temperature to controller every 10min. If controller hasn't received the ambient temperature sent by remote controller for 11min, air conditioner will operate according to the ambient temperature sensed by itself. If I FEEL hasn't been set, ambient temperature will adopt the temperature sensed by air conditioner. Controller displays I FEEL ambient temperature 1°C~59°C.

(13) Health, Cold Plasma Function

At ON status, press health button (if there isn't health button on remote controller, health function is ON in default) on remote controller can set health or cold plasma function. Health or cold plasma function can operate when it set ON and indoor fan operates.

(14) Fahrenheit Display Function

Nixie tube displays current set temperature. If the remote control signal is Fahrenheit, the temperature will be display by Fahrenheit. Set temperature range is 16~30°C (61-86°F) . Under auto mode, nixie tube displays 25°C (77°F) in cooling and fan, and 20°C (68°F) in heating. Cooling only controller only displays 25°C (77°F) .

(15) Locked Protection to Indoor Fan

If the indoor fan motor keeps low rotation speed for a continuous period of time after startup, the unit will stop operation and display "H6".

(16) Quiet Mode

When quiet mode is set by remote controller, indoor fan will operate in quiet mode.

(17) Compulsory Defrosting Function

When the outdoor environment is formidable, such as temperature is too low and humidity is too high, and there is too much frost in outdoor unit which affect the heating effect, users can select compulsory defrosting function to outdoor unit's heating effect.

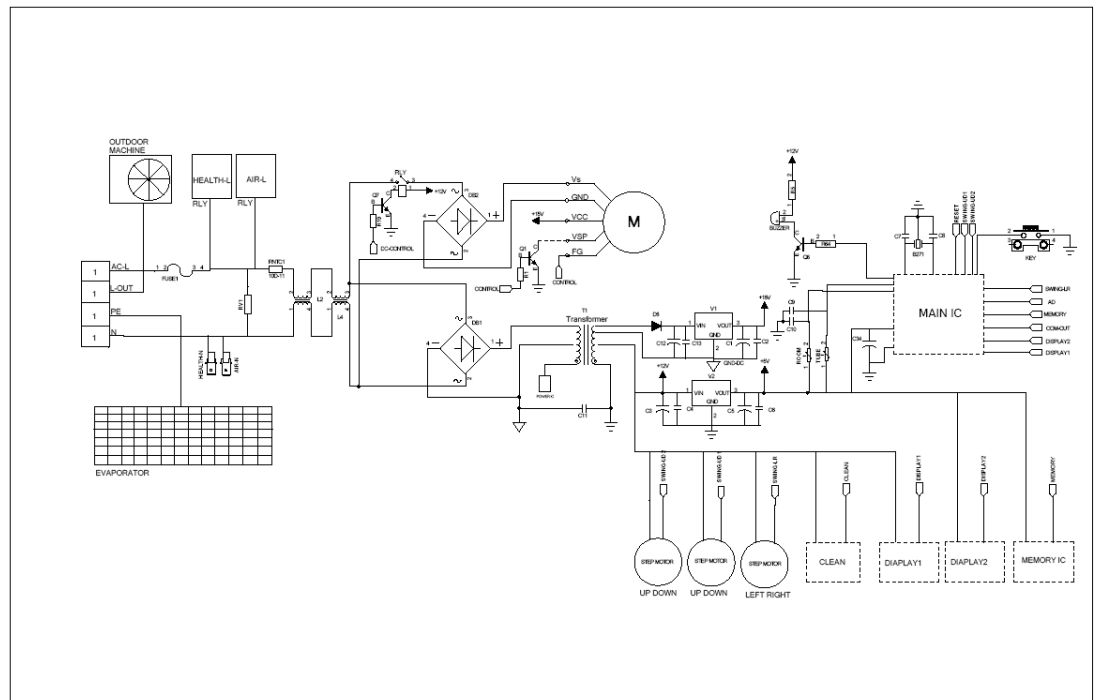
Compulsory defrosting function method:

When the unit is turned on in heating mode by remote controller and the set temperature is 16°C, press "+、-、+、-、+、-" buttons for 5s successively, indoor unit will enter into compulsory defrosting setting and send the compulsory defrosting mode signal to outdoor unit and then outdoor unit will enter into compulsory defrosting mode.

8.Schematic Diagram

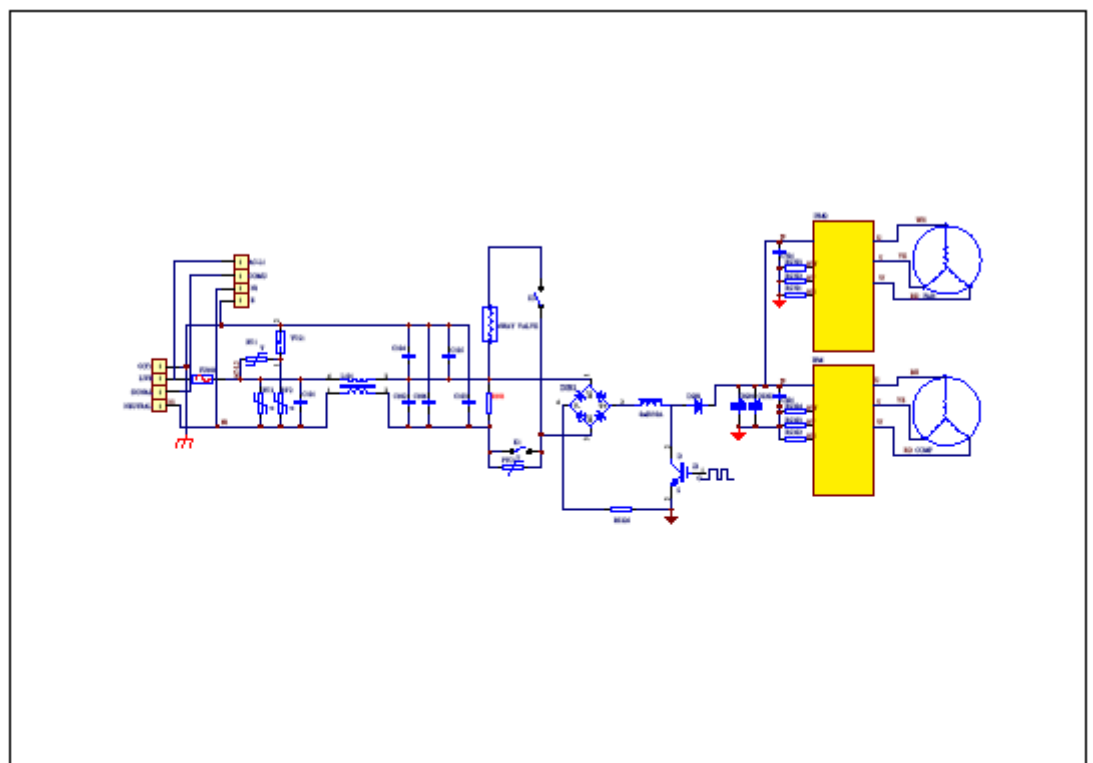
8.1 Electrical Wiring

Indoor Unit



Outdoor Unit

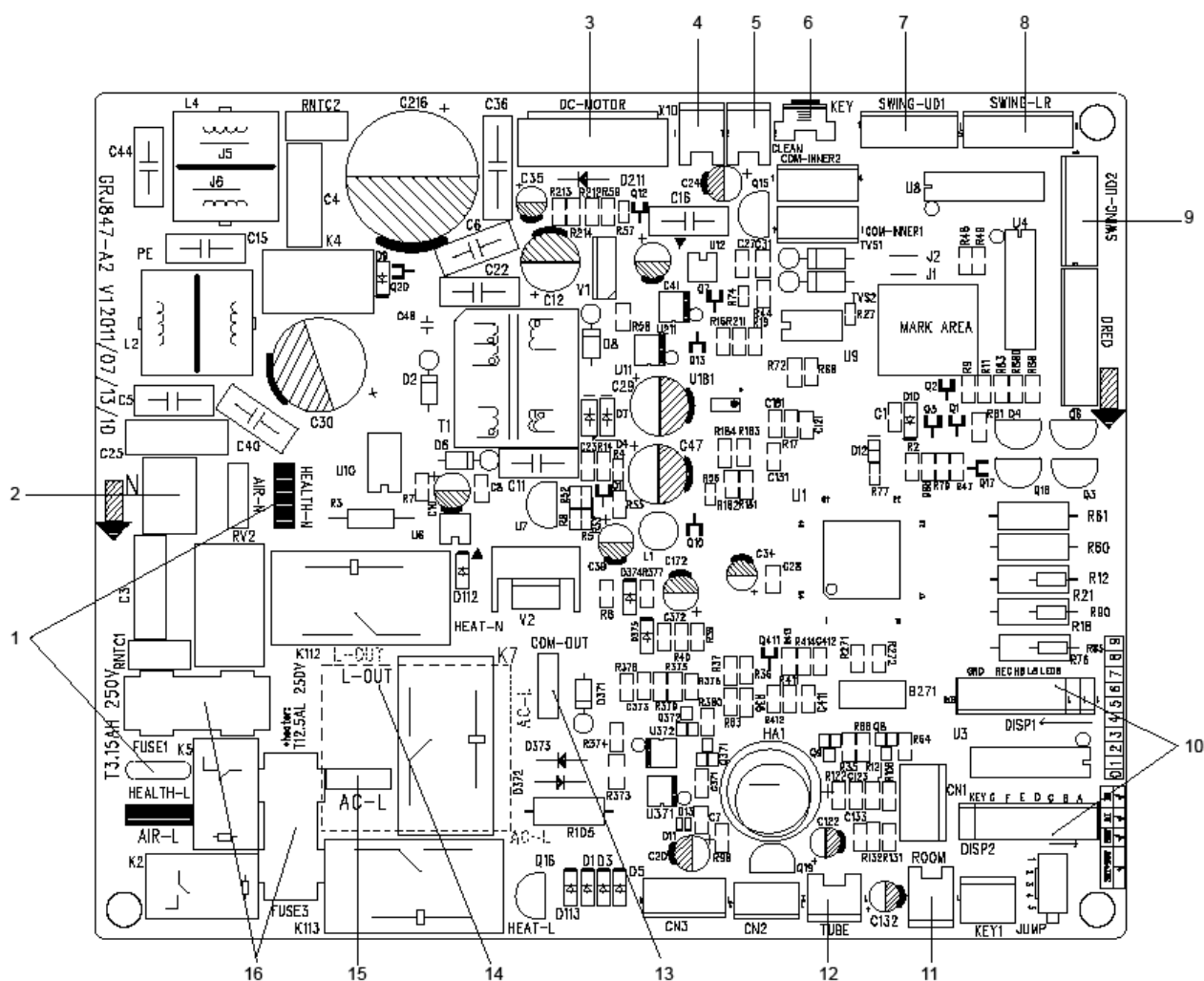
Cooling & Heating Models



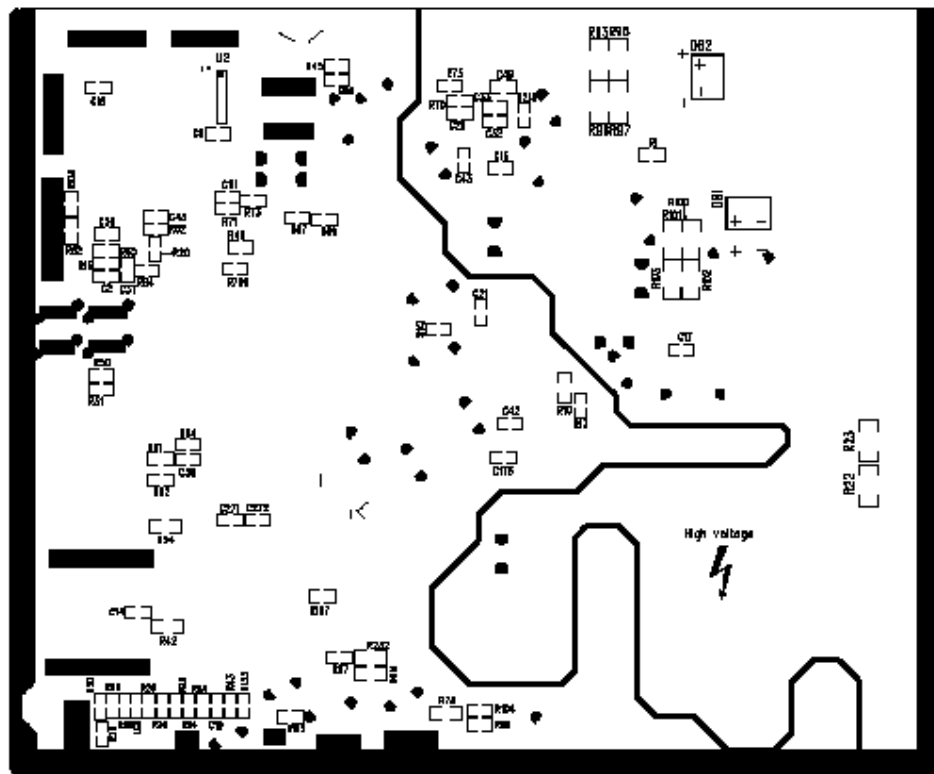
8.2 Printed Circuit Board

Indoor Unit

•TOP VIEW

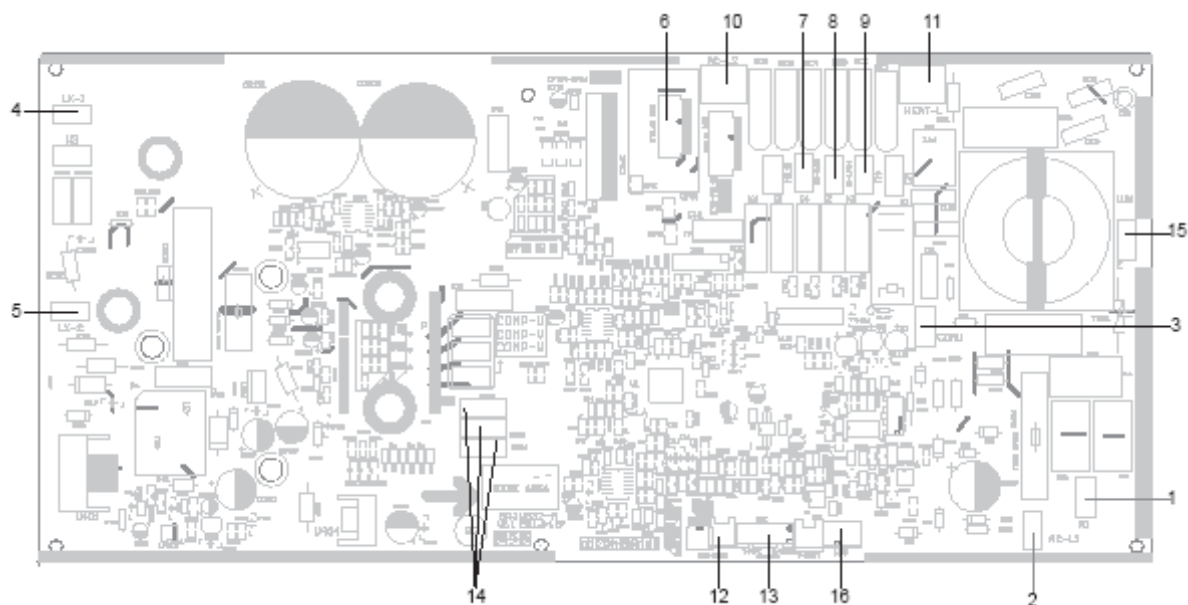


599 75 60-77



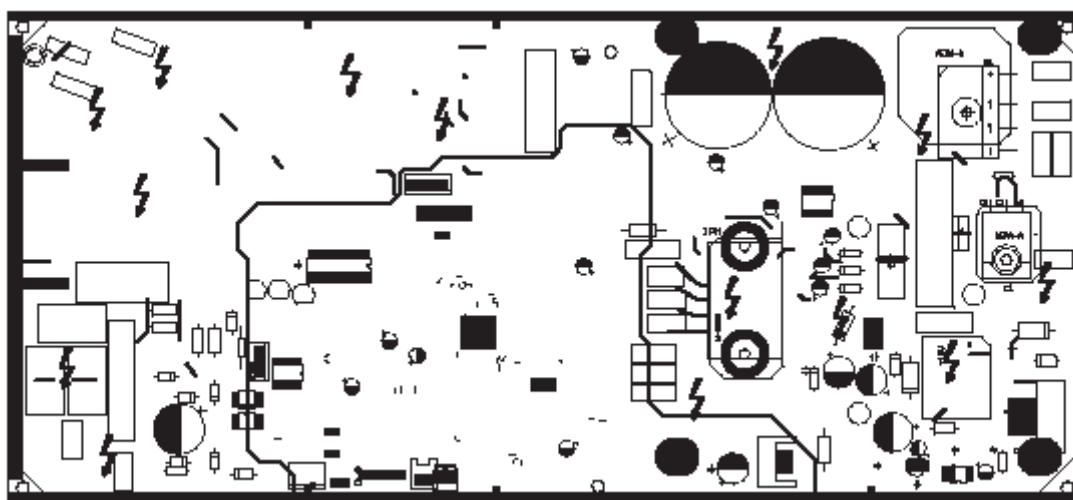
Outdoor Unit

•TOP VIEW



SN	Interface name	SN	Interface name	SN	Interface name
1	Input of neutral wire of power	6	Interface of fan	11	Live wire of electric heater
2	Input of live wire of power	7	Neutral wire of electric heater of chassis	12	Input of overload
3	Communication interface	8	Neutral wire of electric heater of compressor	13	Temp sensor
4	Interface 1 of electric reactor	9	Neutral wire of 4-way valve	14	U,V,W three phases of compressor
5	Interface 2 of electric reactor	10	Live wire of 4-way valve	15	Input of ground wire of power
/	/	/	/	16	Input of Pressure switch

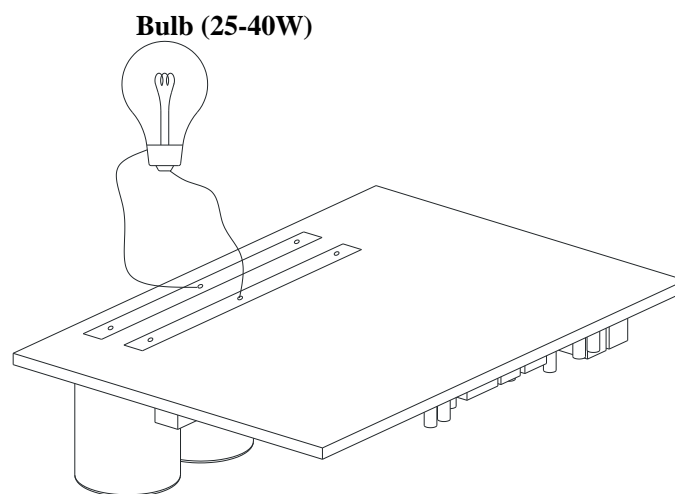
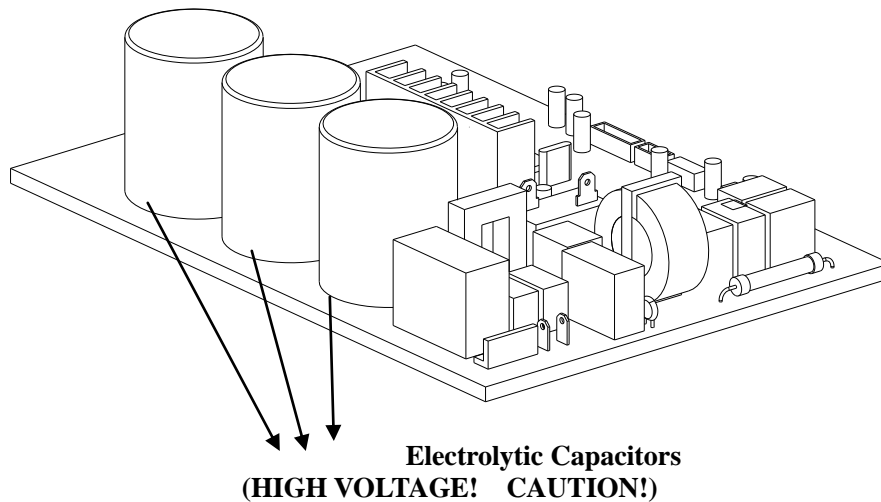
•BOTTOM VIEW



9. Troubleshooting

Safety

Please insure stored voltage is discharged/removed from all relevant high voltage capacitors, by the use of a 25 to 40 watt incandescent globe. As illustrated below.

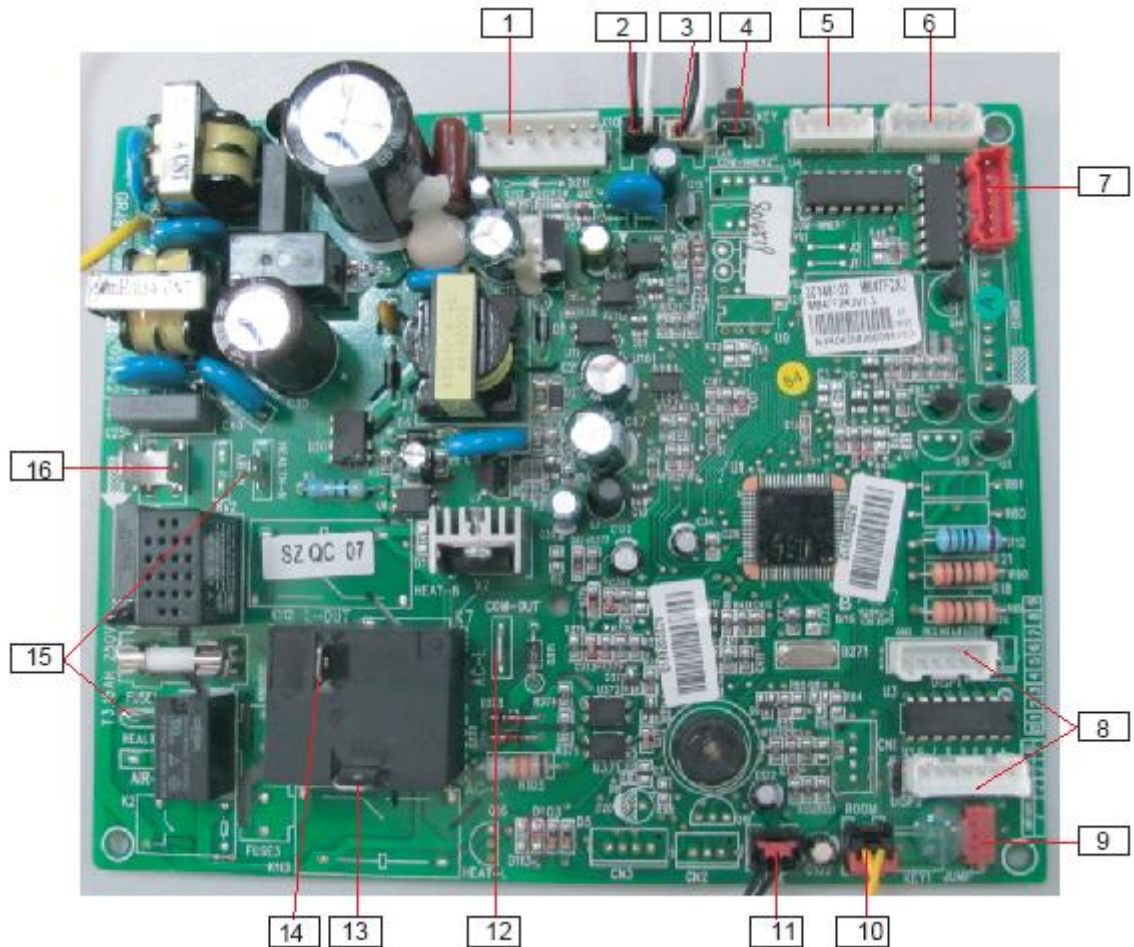


Diagnosis and Solution: Error Code

Name of malfunction	Display of indoor unit	Display of lamp (the times of blinking)						Page NO.
		Indoor			Outdoor			
		Running	Cooling	Heating	Yellow	Red	Green	
Anti-freezing protection	E2	2			3			P45
System block or refrigerant leakage	E3	3				9		P48
Compressor exhaust high temperature protection	E4	4			7			P48
AC over-current protection	E5	5			5			P45
Communication failure between indoor unit and outdoor unit	E6	6					OFF	P44 P39
Anti-high temperature protection	E8	8			6			P48
	H4				6			
No feedback of indoor fan motor	H6	11						P35 P36
Jumper cap malfunction protection	C5	15						P37 P38
Indoor unit and outdoor unit doesn't match	LP	19			16			P47
Outdoor DC fan motor malfunction	L3	23				14		
Power protection	L9	20			9			
Gathering refrigerant	Fo	1	1					
Indoor ambient sensor open or short circuit	F1		1					P33 P34
Indoor tube sensor open or short circuit	F2		2					
Outdoor ambient sensor open or short circuit	F3		3			6		P46
Outdoor tube sensor open or short circuit	F4		4			5		P46
Exhaust sensor open or short circuit	F5		5			7		P46
Overload limit / drop frequency	F6		6			3		
Over current limit / drop frequency	F8		8			1		
High exhaust temperature limit / drop frequency	F9		9			2		
Anti-freezing limit / drop frequency	FH		2	2		4		
Defrosting	H1			1	2			
Compressor overload protection	H3			3	8			P49
IPM protection	H5			5	4			P47
PFC protection	HC			6	14			P46
Loading EEPROM malfunction	EE			15	11			P45
High PN voltage protection	PH		11		13			P44
Low PN voltage protection	PL			21	12			P44
4-way valve reversal abnormal	U7		20					P48
Compressor Min frequency in test state	P0							
Compressor rated frequency in test state	P1							
Compressor maximum frequency in test state	P2							
Compressor intermediate frequency in test state	P3							
Frequency limiting (power)	LU		24			13		
Compressor is running(normal)					1			
The temperature for turning on the unit is reached(normal)						8		
Frequency limiting (module temperature)	EU		6	6		11		
Normal communication						continuously		

Function of Indoor Controller:

1. Interfaces Diagram of Indoor Mainboard



S/N	Silk screen on PCB	Interface	S/N	Silk screen on PCB	Interface
1	DC-MOTOR	Interface of DC motor	11	TUBE	Interface of indoor pipe temp sensor
2	CLEAN	Electrostatic dedusting interface	12	COM-OUT	Interface for communication between indoor and outdoor units
3	X10	Inching switch interface	13	AC-L	Input terminal of live wire of indoor unit
4	KEY	Auto button	14	L-OUT	Output terminal of live wire of outdoor unit
5	SWING-UD1	Interface of motor for vertical swing(interface for small horizontal louver)	15	HEALTH-N HEALTH-L	Interfaces for neutral and live wire of coil plasma
6	SWING-LR	Interface for horizontal swing	16	N	Input terminal of neutral wire of indoor unit Output terminal of neutral wire of outdoor unit
7	SWING-UD2	Interface of motor for vertical swing (interface for big horizontal louver)	/	/	/
8	DISP1 DISP2	Interface for display	/	/	/
9	JUMP	Interface of jumper cap	/	/	/
10	ROOM	Interface of indoor ambient temp sensor	/	/	/

2. Diagram of Display When the Unit is Standby



3. Troubleshooting of Indoor Unit

3.1 Malfunction Code Table of Indoor Unit

No.	Display Method of Indoor Unit					A/C Status	Possible Causes
	Malfunction Name	Error Code	LED lamp				
			(During blinking, ON for 0.5S and OFF for 0.5 S)				
			Operation Lamp	COOL Lamp	HEAT Lamp		
1	Indoor ambient temperature sensor is open/short- circuited	F1		OFF 3S and blinks once		The unit will stop operation as it reaches the temperature point. During cooling and drying operation, except indoor fan operates, other loads stop operation; During heating operation, the complete unit stops operation.	1. The wiring terminal between indoor ambient temperature sensor and controller is loosened or poorly contacted; 2. There's short circuit due to trip-over of the parts on controller; 3.Indoor ambient temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor) 4. Main board is broken.
2	Indoor evaporator temperature sensor is open/short-circuited	F2		OFF 3S and blinks twice		The unit will stop operation as it reaches the temperature point. During cooling and drying operation, except indoor fan operates, other loads stop operation; During heating operation, the complete unit stops operation.	1. The wiring terminal between indoor evaporator temperature sensor and controller is loosened or poorly contacted; 2. There's short circuit due to the trip-over of the parts on controller; 3.Indoor evaporator temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor) 4. Main board is broken.
3	PG motor (indoor fan motor) does not operate	H6	OFF 3S and blinks 11 for times			Indoor fan, outdoor fan, compressor and electric heat tube stop operation. Horizontal louver stops at the current position.	1. The feedback terminal of PG motor is not connected tightly. 2. The control terminal of DC PG motor is not connected tightly. 3. Fan is blocked 4. Motor has malfunction The circuit of mainboard for detecting rotational speed has malfunction
4	Protection due to malfunction of jumper cap	C5	OFF 3S and blinks for 15 times			Operation of remote controller or control panel is available, but the unit won't act.	1. There's no jumper cap on the controller. 2. Jumper cap is not inserted properly and tightly. 3. Jumper cap is damaged. 4. Corresponding circuit on mainboard has malfunction.
5	Communication malfunction	E6	OFF 3S and blinks for 6 times			During cooling operation, compressor stops while indoor fan motor operates. During heating operation, the complete unit stops operation.	1. The communication line is not connected tightly or poorly contacted. Poor contact of any line may cause communication malfunction. 2. The match between main board and display panel is incorrect. Indoor and outdoor unit boards are matched incorrectly. 3. Incorrect wire connection. 4. Controller of indoor unit is damaged.

3.2 Each Troubleshooting and Schematic Diagram

3.2.1 Firstly, check if power supply is normal

Check if power supply is normal and the voltage is between 165V~235V.

3.2.2 Refer to *Malfunction Code Table* and confirm the malfunction according to malfunction code displayed on indoor unit.

F1, F2 Malfunctions

Malfunction of indoor ambient temperature sensor: F1 is displayed; COOL LED lamp is off for 3s and blinks once; (That the LED lamp is on for 0.5s and off for 0.5s is a blink.)

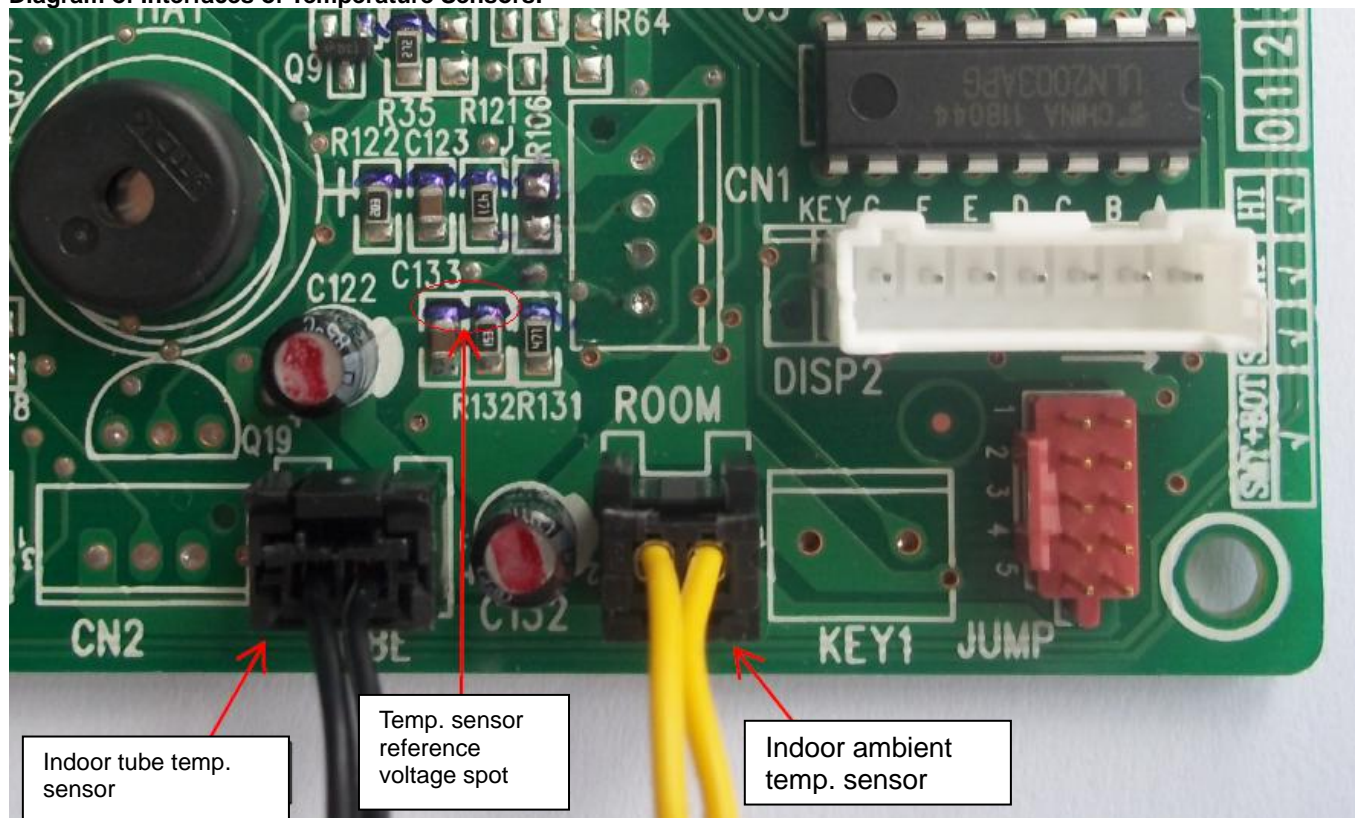
Malfunction of indoor pipe temperature sensor: F2 is displayed; COOL LED lamp is off for 3s and blinks twice; (That the LED lamp is on for 0.5s and off for 0.5s is a blink.)

Resistance of indoor ambient temperature sensor: 15K Ω

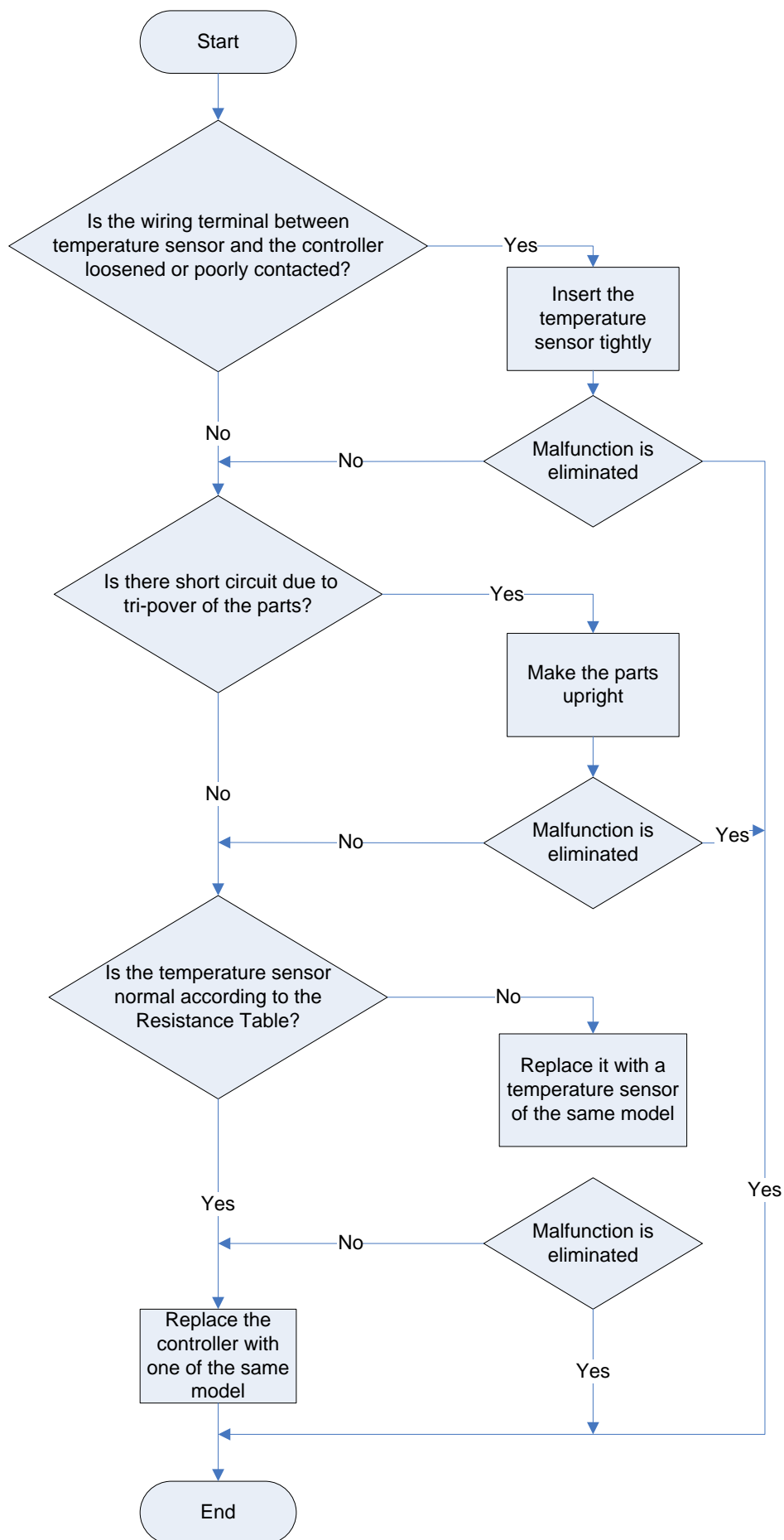
Resistance of indoor pipe temperature sensor: 20K Ω

Reference voltage value of temperature sensor: 0VDC

Diagram of Interfaces of Temperature Sensors:



F1,F2 Malfunctions:
Flowchart:



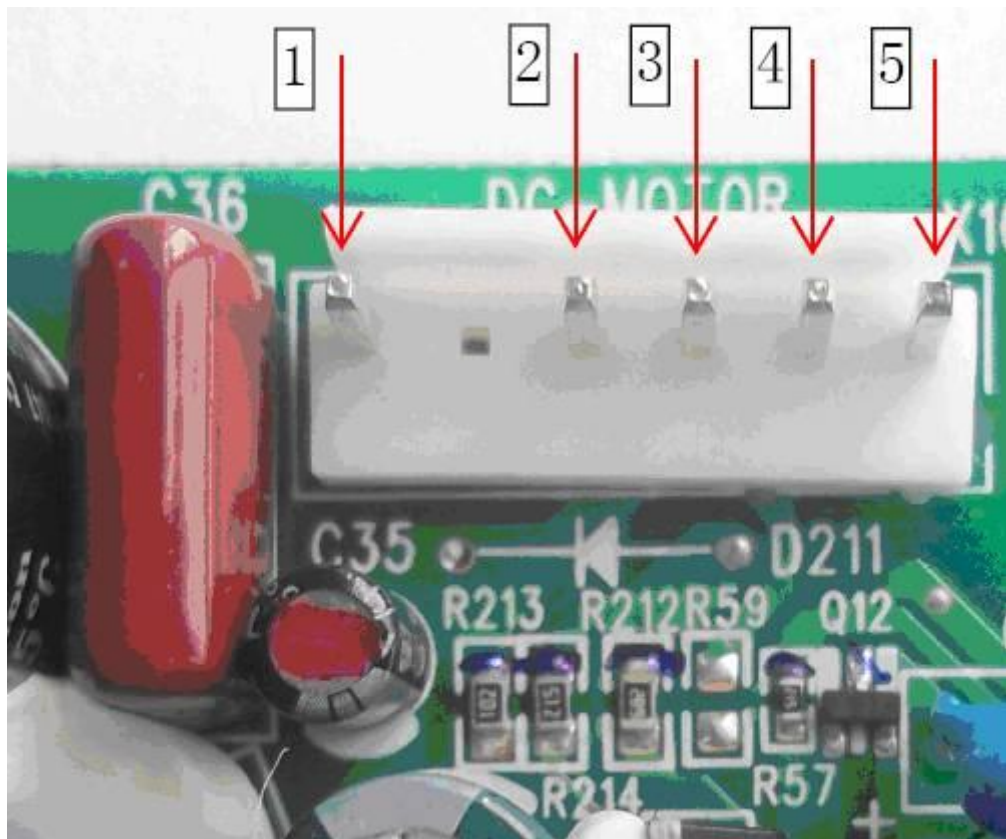
(2) Malfunction of Indoor Motor

There is no feedback from indoor motor: H6 is displayed and LED lamp is off for 3s and blinks for 11 times. (That the LED lamp is on for 0.5s and off for 0.5s is a blink.)

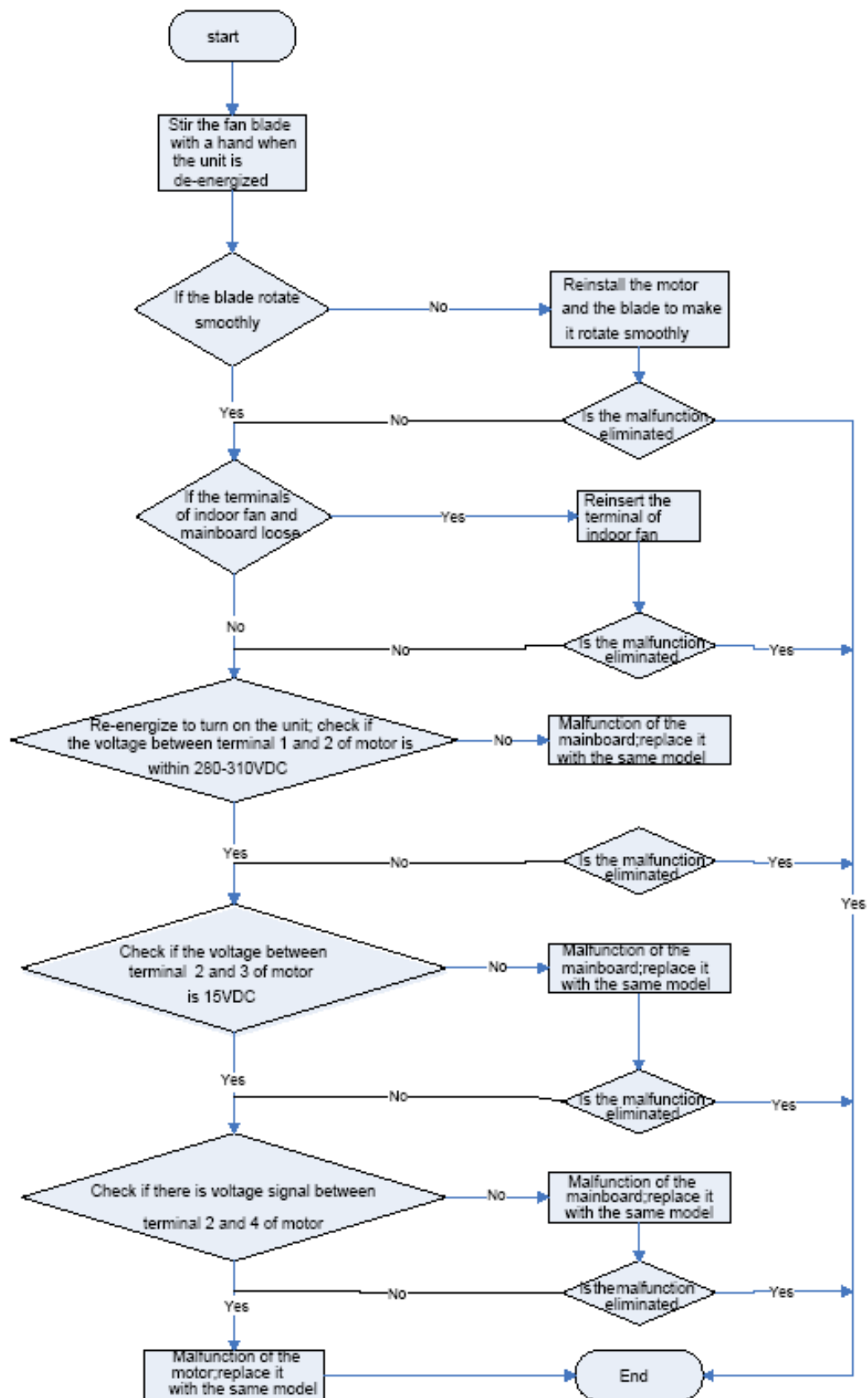
Interface of DC motor ;

- 1.VDC DC power supply , normal working voltage: 280~310VDC ;
- 2.Reference voltage point of GND DC motor ;
- 3.Control voltage of Vcc DC motor: 15VDC ;
- 4.Vsp voltage value is proportional to rotational speed ;
- 5.Feedback voltage of Vpg DC motor is proportional to rotational speed ;

Diagram of Interfaces of DC Motor:



Flowchart:

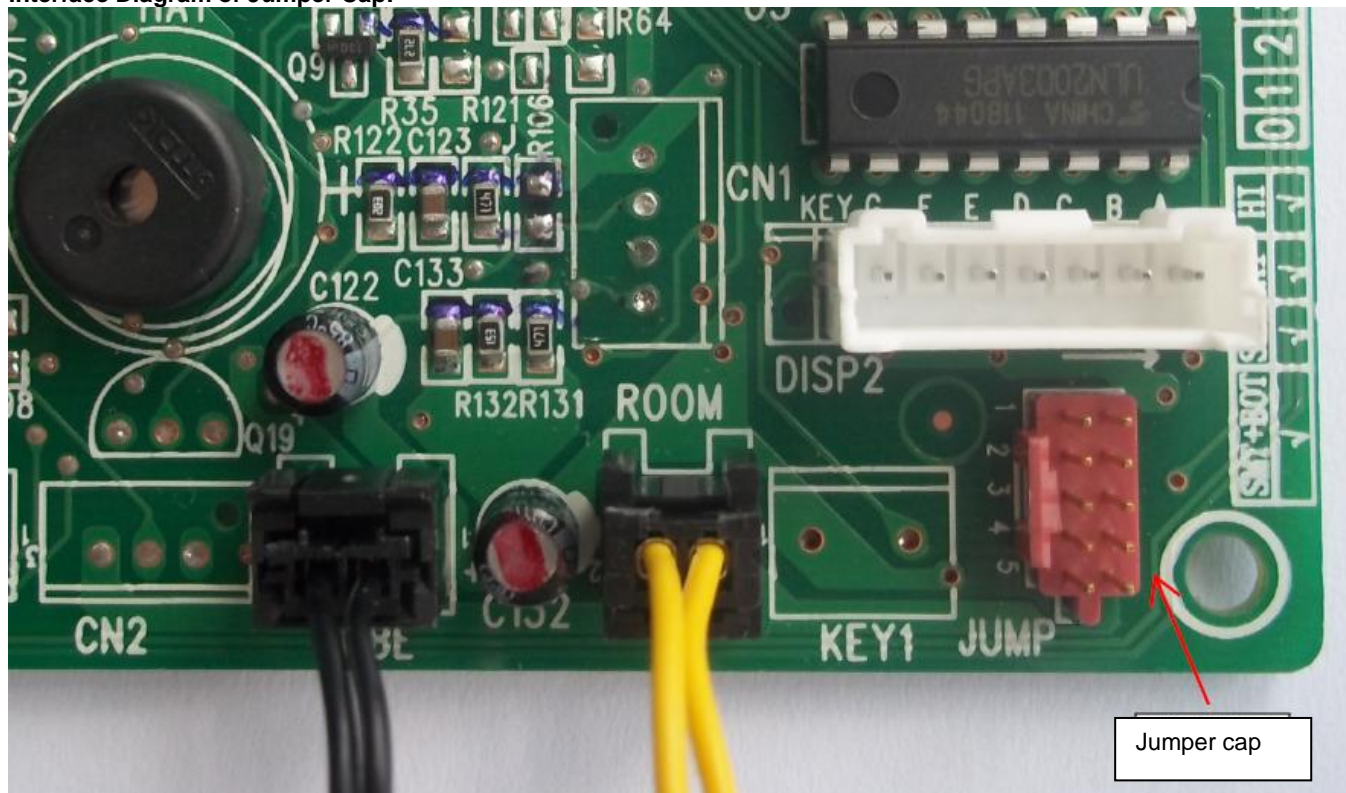


(3) Malfunction of Jumper Cap

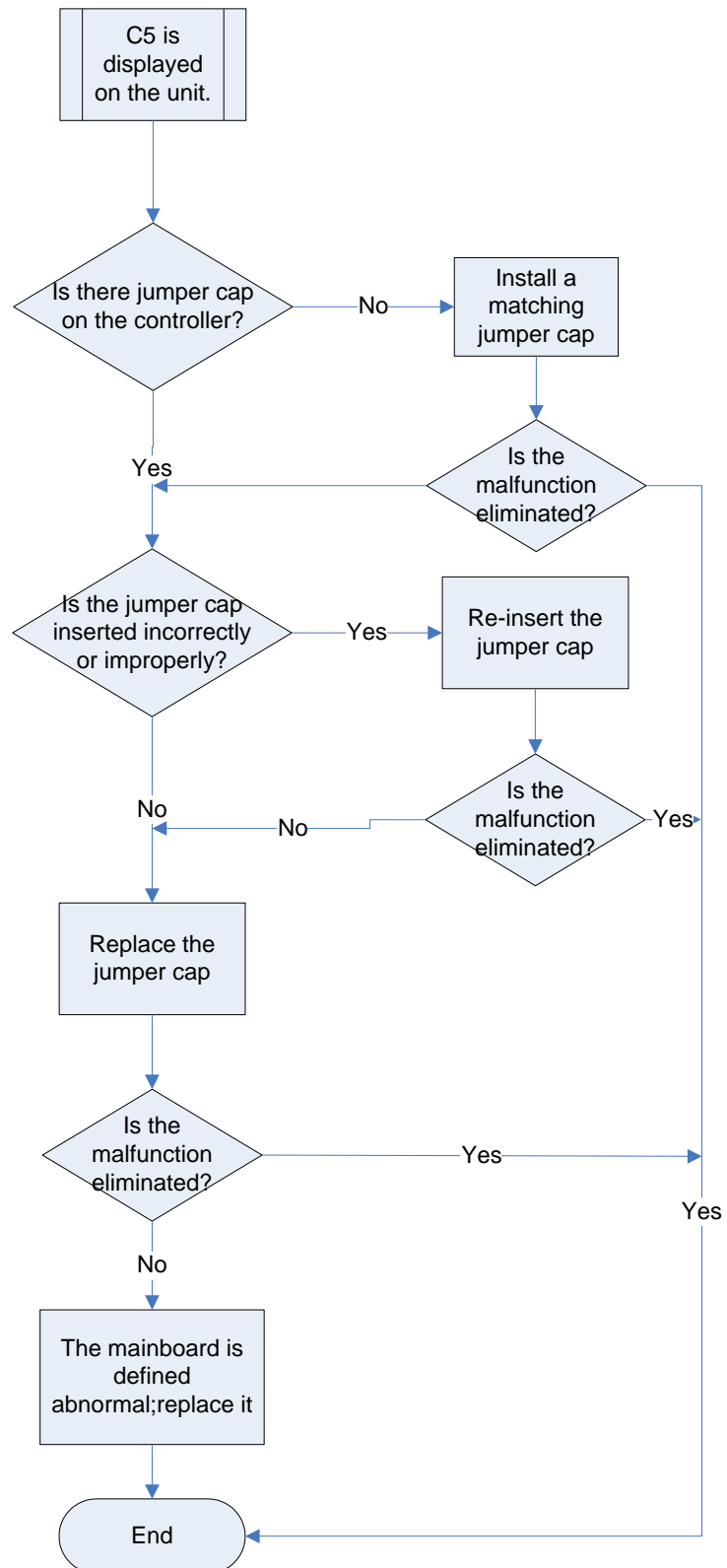
Malfunction of Jumper Cap: C5 is displayed; Operation LED lamp is off for 3s and blinks for 15 times. (That the LED lamp is on for 0.5s and off for 0.5s is a blink.)

Function of jumper cap: determine swing angle of different models and rotational speed of indoor fan.

Interface Diagram of Jumper Cap:



Flowchart:

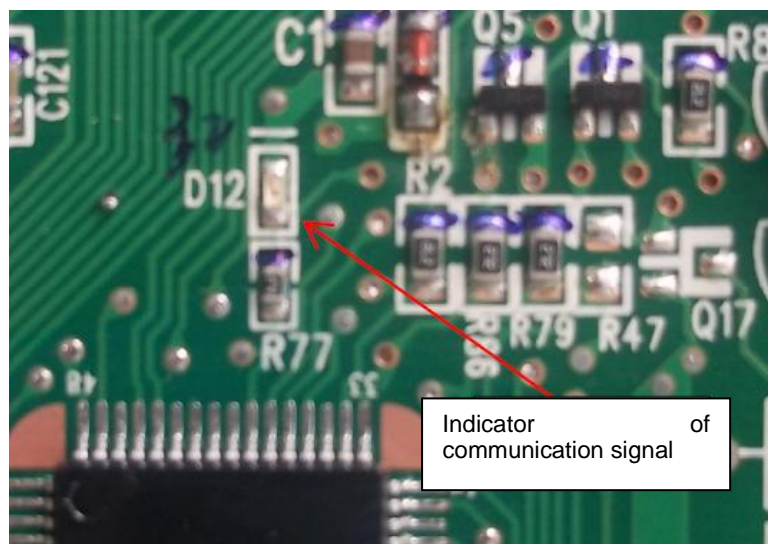


(4) Communication Malfunction between Indoor and Outdoor Units

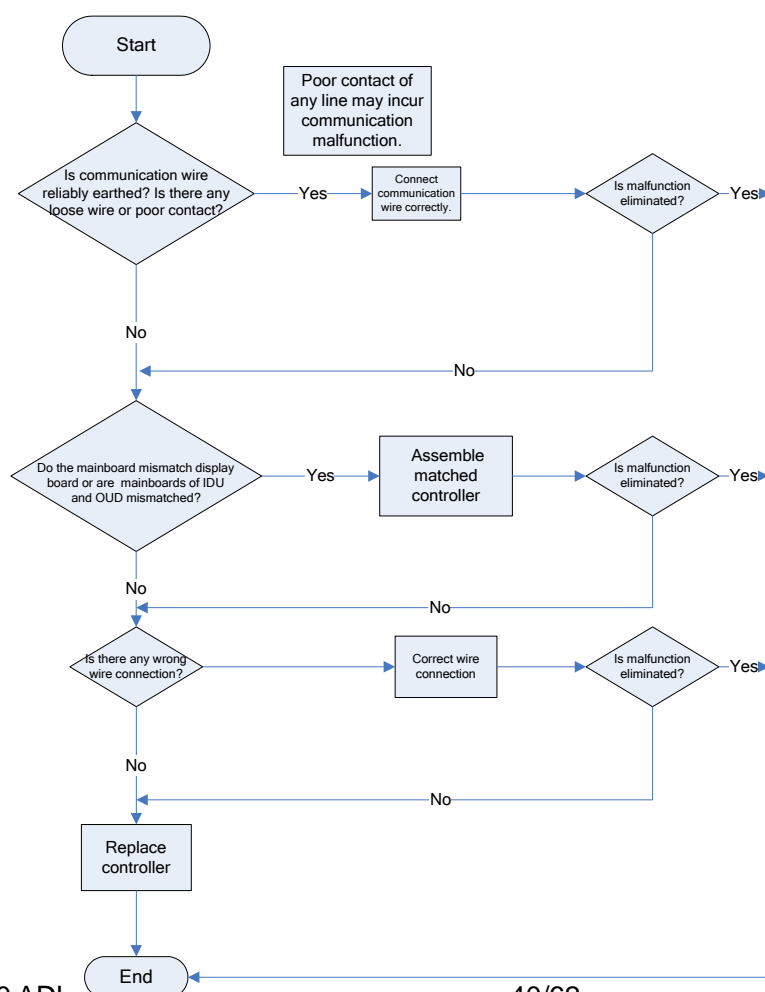
Communication malfunction between indoor and outdoor units: E6 is displayed and operation LED lamp is off for 3s and blinks for 6 times. (That the LED lamp is on for 0.5s and off for 0.5s is a blink.)

When communication between indoor and outdoor units is normal, communication LED lamp of indoor unit blinks (off for 0.5s and on for 0.5s). When correct signal has not been received for continuous 3 minutes, there is communication malfunction and communication LED lamp will be off.

Diagram of Communication LED lamp of Indoor Unit:



Flowchart:

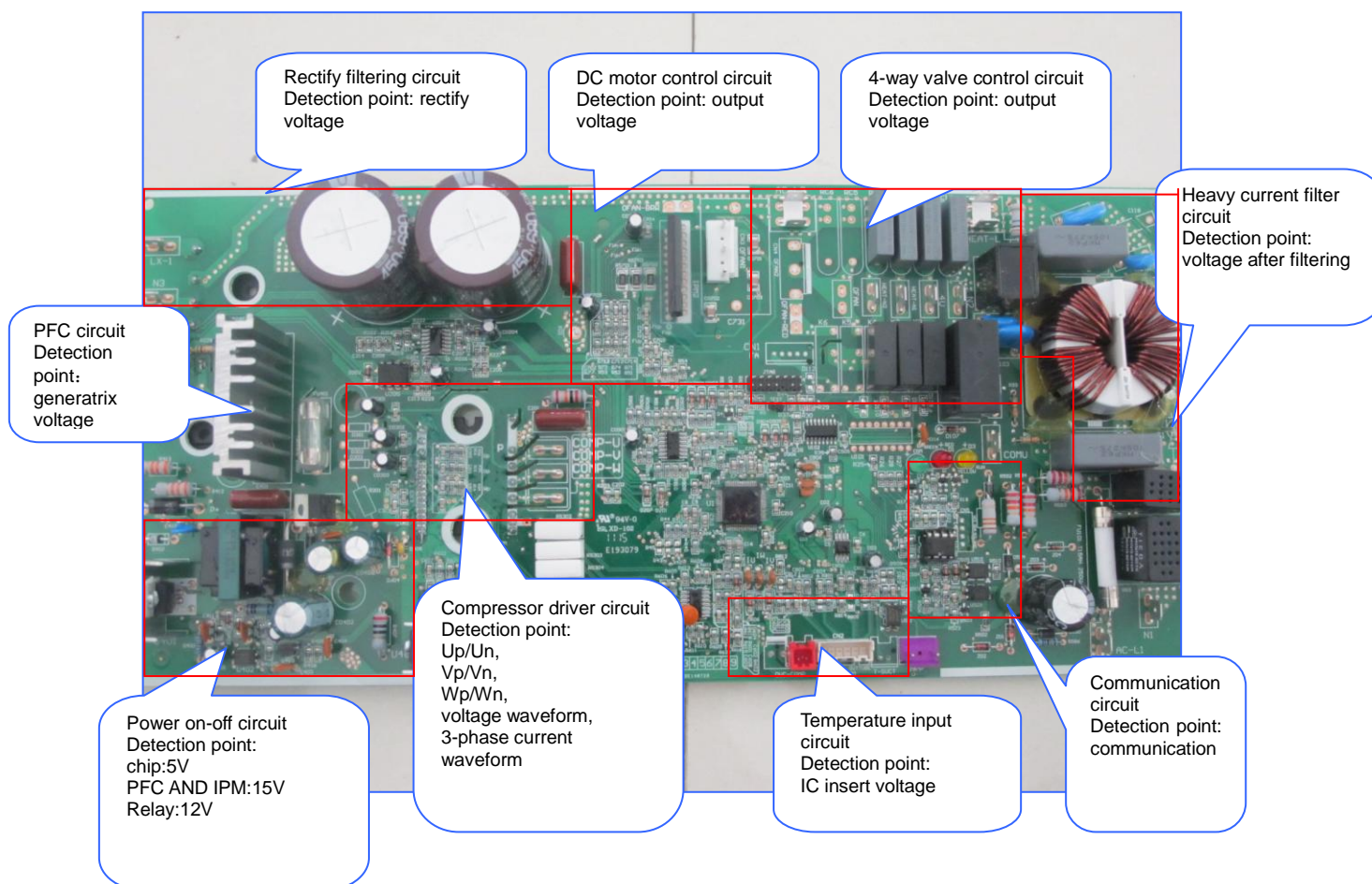


4. Cautions:

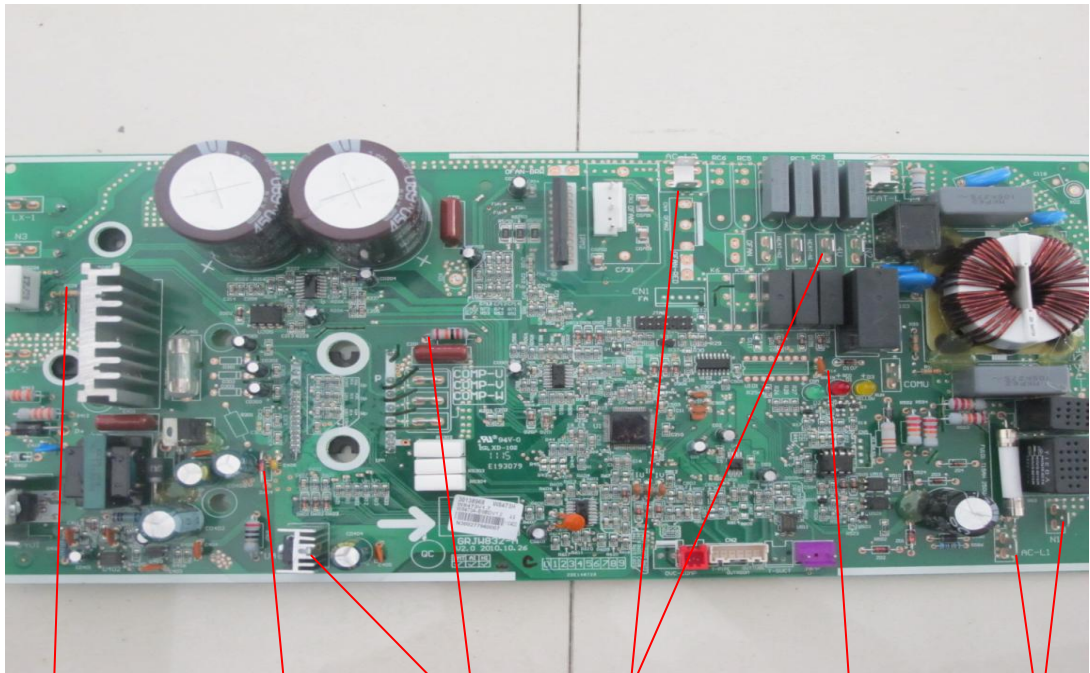
- (1) Before replacing indoor mainboard, check if the substituted mainboard is qualified. The following tests shall be done:
 - a. Test if protective tube FUSE1 is open-circuit. If so, replace it with a protective tube of same model.
 - b. Energize the unit to test if the buzzer will sound. If not, this mainboard of the indoor unit can't be used.
 - c. Equip the display and energize the unit to test if the display is normal. If not, that mainboard of indoor unit can't be used.
- (2) The model of the mainboard used for replacement shall be the same as the previous mainboard which has malfunction. And the model of jumper cap assembled for the new mainboard shall also be the same as that of previous mainboard.
- (3) The wiring shall also be the same.

Function of Outdoor Mainboard

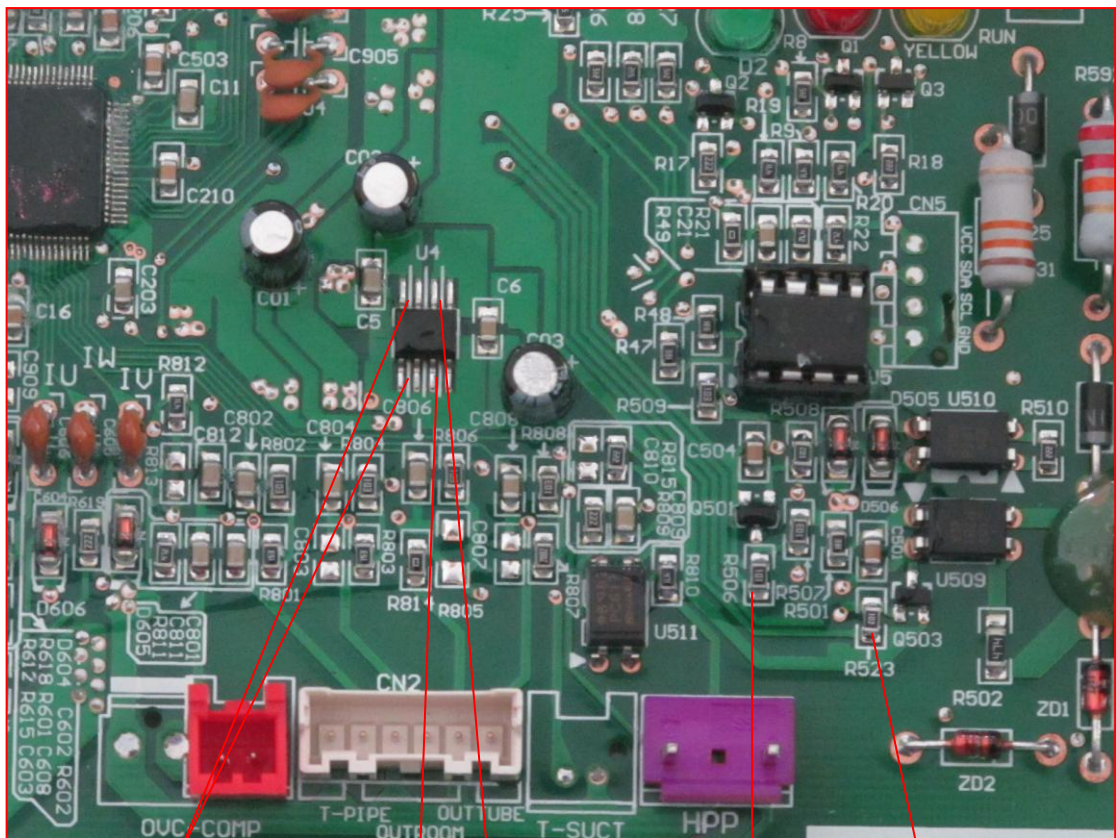
Introduction to each Detection Point



No. of Detection point	Detection point	Corresponding parameter	Test value under normal conditions
Point 1	Between AC-L1,N1	Neutral and live wire	165 V ~ 253 V
Point 2	Left side of R201;U404 heat sink	DC bus bar	230 V ~ 380 V
Point 3	Top of D304;bottom of D304	IPM drive voltage+15V	13.5 V ~15.5 V
Point 4	Top of C116; bottom of C116	Relay drive voltage+12V	11 V ~13 V
Point 5	Right side of R228; left side of R228	PFC drive voltage+15V	13.5 V ~15.5 V
Point 6	Two pins on upper left of U4; bottom of U4 (the top is close to "U4"silk screen)	Chip+3.3V	3.1 V ~3.3 V
Point 7	Two pins on upper left of U4; Bottom of U4	+5V	4.8 V ~5.1 V
Point 8	Bottom of R506; bottom of U4	Signal is received by outdoor unit	Between 0 and 3.3V
Point 9	Bottom of R523; bottom of U4	Signal is sent by outdoor unit	Between 0 and 3.3V
Point 10	Between AC-L2/4V	Neutral and live wire	165 V ~ 253 V



- Detection point 5
- Detection point 3
- Detection point 2
- Detection point 10
- Detection point 4
- Detection point 1



- Detection point 6
- Detection point 7
- Detection point 8
- Detection point 9

3. Troubleshooting of Outdoor Unit

3.1 Firstly, check if power supply is normal

Check if power switch is turned on and the voltage is between 165V~253V.

3.2 Malfunction Code Table of Outdoor Unit

Malfunction Name	Nixie Tube	LED Lamp		
		Yellow LED Lamp	Red LED Lamp	Green LED Lamp
Freeze Protection	E2	Blinks for 3 times		
IPM protection	H5	Blinks for 4 times		
Overcurrent protection	E5	Blinks for 5 times		
EEPROM reading and writing malfunction	EE	Blinks for 11 times		
Low voltage protection	PL	Blinks for 12 times		
High voltage protection	PH	Blinks for 13 times		
PFC overcurrent protection	HC	Blinks for 14 times		
Mismatching of models of indoor and outdoor units	LP	Blinks for 16 times		
Malfunction of outdoor ambient temperature sensor	F3		Blinks for 6 times	
Malfunction of outdoor pipe temperature sensor	F4		Blinks for 5 times	
Malfunction of outdoor discharge temperature sensor	F5		Blinks for 7 times	
Communication malfunction	E6			灭
Low pressure protection(refrigerant leak)	E3		Blinks for 9 times	
Abnormality of 4-way valve	U7			
Over-load protection	E8	Blinks for 6 times		
Discharge temperature protection	E4	Blinks for 7 times		
Overload protection	H3	Blinks for 8 times		
Over power protection	L9	Blinks for 9 times		

3.3 Each Malfunction and Diagram

(1) LED Lamp Status Description

Different status of green, red and yellow indicators indicate different operation status and protection of the unit.

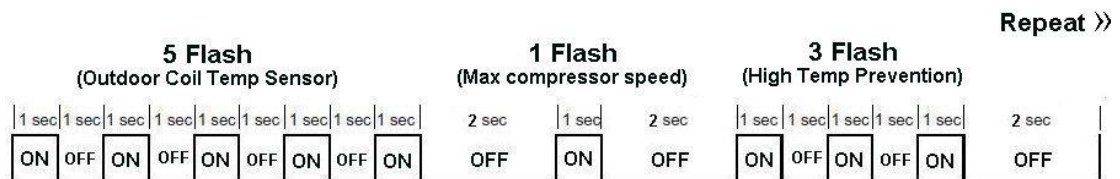
Note:The LED's flash at a 1 second rate for the required number of flashes, and then a 2 second pause before repeating the 1 second rate sequence.

Note: Two or more faults can appear in the one LED fault sequence.

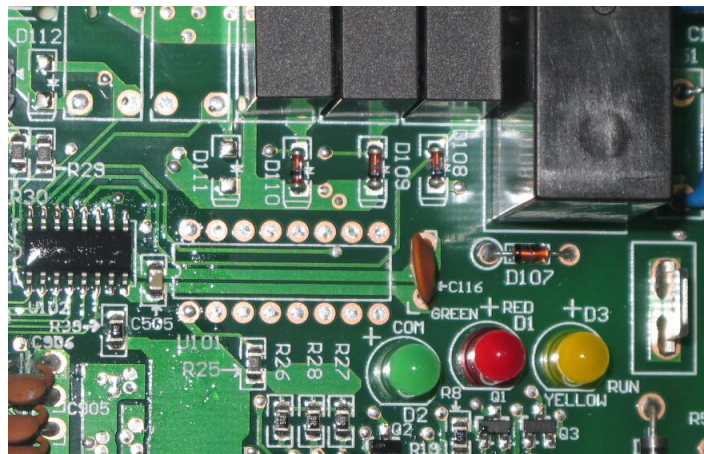
Example of LED sequence:



Single fault code sequence.



Mutable fault code sequence.



(2) Low Voltage protection

PL is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 12 times

Check voltage of power supply.

(3) High voltage protection

PH is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 13 times.

Check voltage of power supply.

(4) Communication Malfunction

E6 is displayed on indoor unit

Green LED lamp of outdoor unit doesn't blink.

If there is no LED lamp blinking,

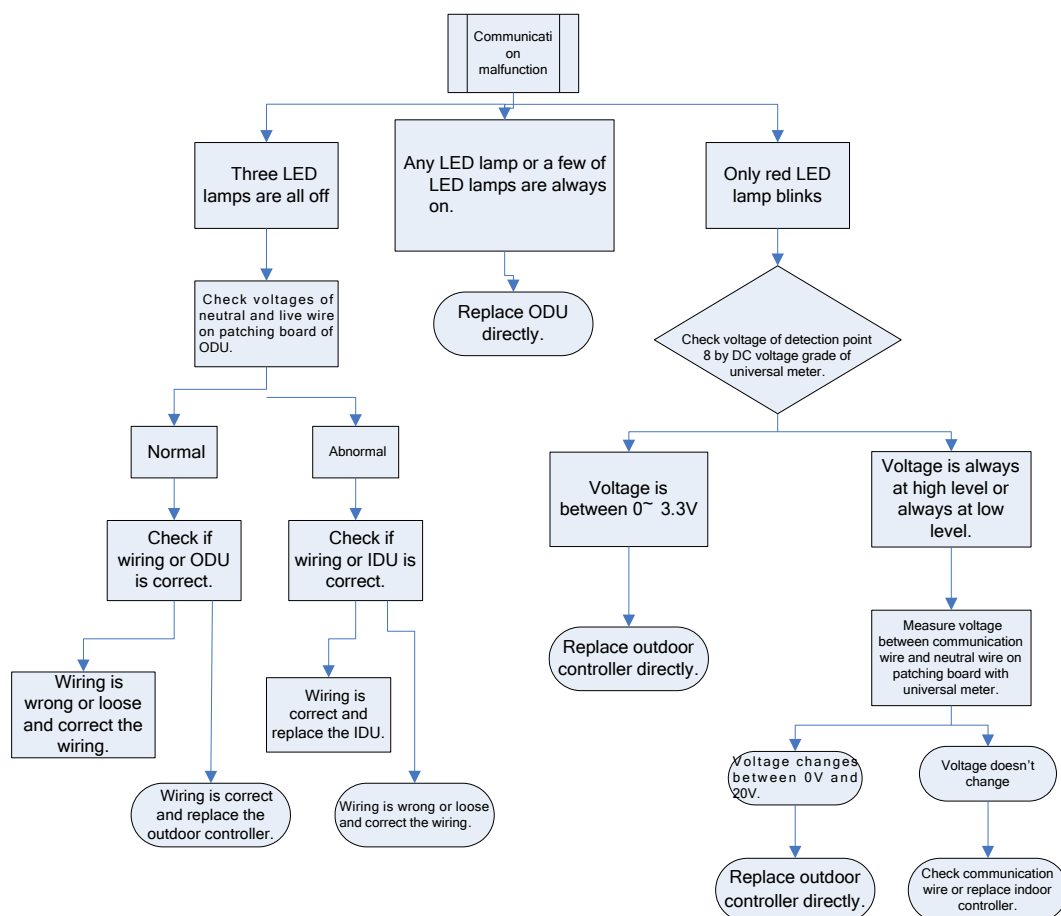
1. Measure voltage between N1 (neutral wire) and 3 (live wire) on patching board of outdoor electric box by AC voltage grade of universal meter. If it is found that there is voltage, check if there is electricity for patching board of indoor unit. If there is no electricity, check if wiring of indoor unit is correct. Otherwise replace controller of indoor unit.
2. If power supply of indoor unit is normal, check if wiring of outdoor unit is correct and if there is any wrong or loose wiring.
3. If the above two conditions don't exist, outdoor controller can be replaced directly.

Any or a few of indicators are normally on,

Such circumstance usually indicates that IC on outdoor controller doesn't work. Outdoor controller can be replaced directly.

There is only red indicator blinking

1. Set universal meter to DC voltage grade to measure voltage of detection point 8. If voltage is between 0~3.3V, the signal has been sent by indoor unit but not received by outdoor unit yet. In that case, replace outdoor controller directly.
2. If voltage of detection point 8 is always around 3.3V or around 0V, set universal meter to AC voltage to measure voltage between communication wire (2) and neutral wire (N1) on patching board. If voltage swings between 0V and 20V, the signal has been sent by indoor unit but not received by outdoor unit yet. In that case, replace outdoor controller directly. If voltage doesn't change, indoor unit has not sent signal or the communication wire is damaged. Check communication wire or replace indoor controller.



(5) Freeze Protection

E2 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 3 times

It indicates that the temperature of indoor evaporator is too low so it is easily frozen. Check if indoor fan is operating.

(6) Over current protection

E5 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 5 times

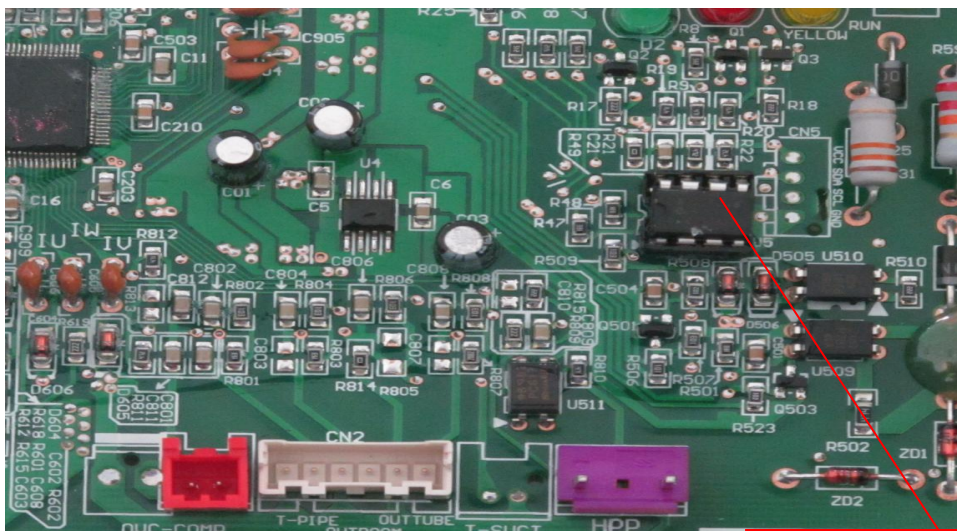
#It indicates that the current of the complete unit is too large. Check if voltage of power supply is normal.

(7) EEPROM Reading and Writing Malfunction

EE is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 11 times

Check if EEPRPM is assembled correctly.



Position of EEPROM

(8) Outdoor Ambient Temp. Sensor Malfunction

F3 is displayed on indoor unit

Red LED lamp of outdoor unit blinks for 6 times

Check if external ambient temp. sensor is well connected

Check if external ambient temp. sensor is open-circuit or short-circuit

(9) Outdoor Tube Temp. Sensor Malfunction

F4 is displayed on indoor unit

Red LED lamp of outdoor unit blinks for 5 times

Check if external tube temp. sensor is well connected

Check if external tube temp. sensor is open-circuit or short-circuit

(10) Outdoor Air Discharging Temp. Sensor Malfunction

F5 is displayed on indoor unit

Red LED lamp of outdoor unit blinks for 7 times

Check if the air discharging temp. sensor is well connected

Check if air discharging temp. resistance is open-circuit or short-circuit

(11) PFC Over Current Protection

HC is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 14 times

Check if the power supply voltage is normal

Check if there is short circuit between any two pins. If so, IGBT is damaged. Replace the IGBT and turn on the unit again. If IGBT is still burnt out, the PFC drive circuit is damaged, replace the mainboard.

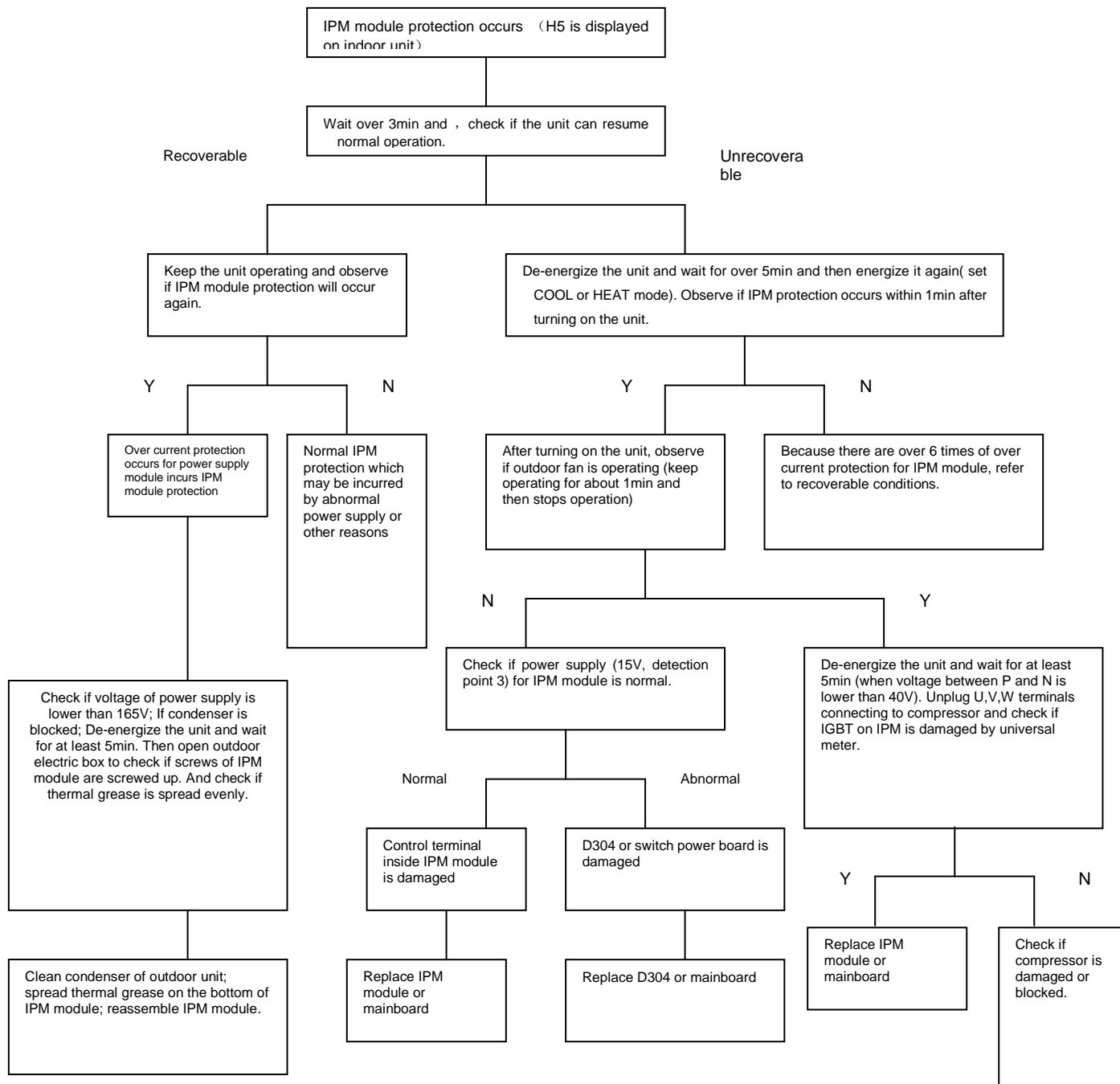
Check if voltage of PFC is normal (15V). If not, check switch power module.

(12) IPM Protection

H5 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 4 times

Check if the compressor module is normal: check if it is short circuit of the outdoor unit mainboard bus bar (the left side of R201, see test point 2) and phase U, V, W, check if it is short circuit of earth wire (Radiator U404, see test point 2) and phase U, V, W, if so, the module is damaged. If not, check the AC with following steps

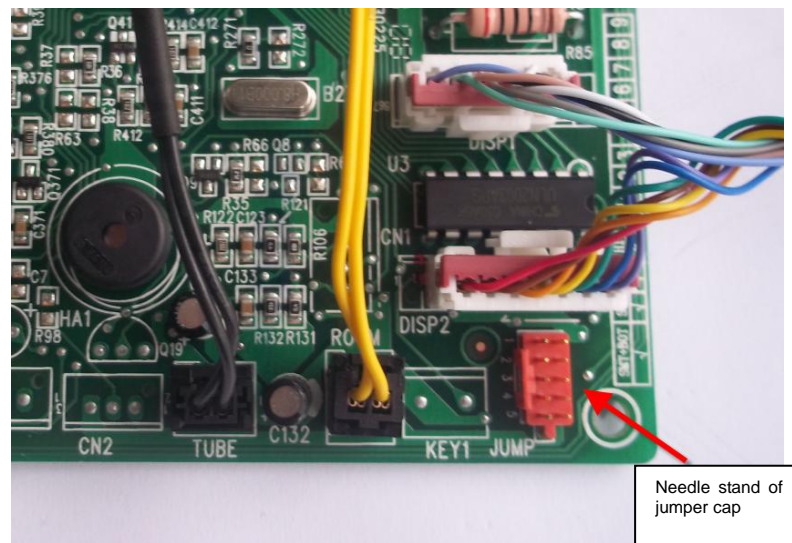


(13) Mismatching of indoor and outdoor unit

LP is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 16 times

Check if jumper cap of indoor unit is applicable.



(14) Low Pressure Protection (refrigerant leak) (not applicable to this model)

E3 is displayed on indoor unit

Red LED lamp of outdoor unit blinks for 9 time

Check if refrigerant leaks and if connecting pipe is correctly connected.

(15) Abnormality of 4-way valve

U7 is displayed on indoor unit

If 4-way valve is abnormally working, check 4-way valve is damaged; cut-off power and unplug 2 wire of 4-way valve. Then measure resistance between two wire. If the resistance is not between 1~2K, the electromagnetic valve is open circuit. In that case, replace coil of 4-way valve.

(16) Over-load Protection Function

E8 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 6 times.

Measure temperature of outdoor heat exchanger during COOL operation; measuring temperature of indoor heat exchanger during HEAT operation.

When $T_{\text{pipe}} \leq T1^{\circ}\text{C}$, the previous operation status will be resumed.

When $T_{\text{pipe}} \geq T2^{\circ}\text{C}$, if $T_{\text{pipe}} \leq T1^{\circ}\text{C}$ for continuous 3min, normal operation will be resumed;

When $T_{\text{pipe}} \geq T3^{\circ}\text{C}$, compressor will operate at decreased frequency;

When $T_{\text{pipe}} \geq T4^{\circ}\text{C}$, compressor will stop operation;

During COOL and DRY operations: $T1=52$, $T2=55$, $T3=58$, $T4=62$;

During HEAT operation: $T1=50$, $T2=53$, $T=56$, $T4=60$;

Check if temperature of pipe meets the above conditions of over-load protection.

(17) Discharge Temperature Protection

E4 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 7 times

When $T_{B_{discharge}} \geq 98^{\circ}\text{C}$, the frequency is prohibited to increase;

When $T_{B_{discharge}} \geq 103^{\circ}\text{C}$, the compressor operates at decreased frequency;

When $T_{B_{discharge}} \geq 110^{\circ}\text{C}$, the compressor stops operation;

When $T_{B_{discharge}} \leq 90$, when compressor has stopped operation for 3min, it will resume operation.

Check if discharge temperature meets the above conditions of protection.

(18) Overload Protection

H3 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 8 times.

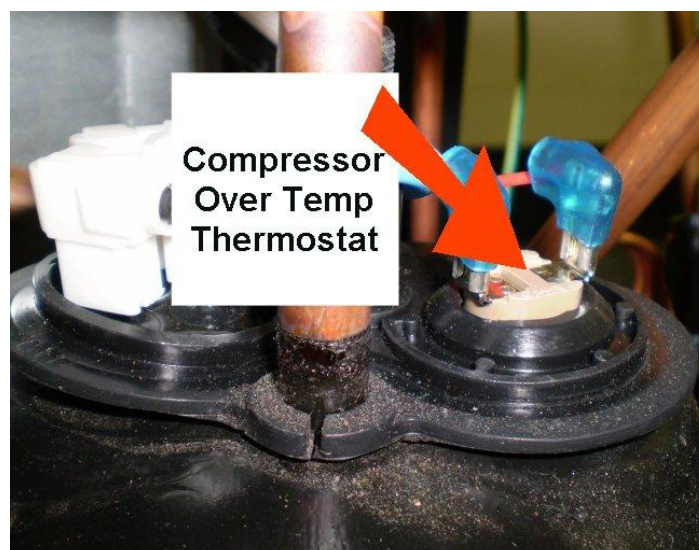
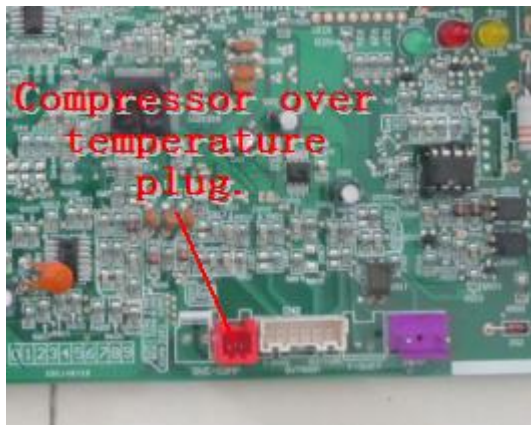
Check the following points:

- Refrigerant charge.
- Restrictions within the capillary tube.
- Poor air flow across the indoor & outdoor coils.
- Correct operation of the four way reversing valve.

Check the Compressor Over Temperature connector plug located on the outdoor PCB for correct termination & **continuity** to the over temperature protector.

Check the over temperature protector located next to the three compressor terminals.

Note: This over temperature protector is “normally closed”.



(19) Power Protection

L9 is displayed on indoor unit

Yellow LED lamp of outdoor unit blinks for 9 times

When $P_c \geq 1900w$, if $P_c \leq 1800w$ for continuous 3min, the unit will resume normal operation;

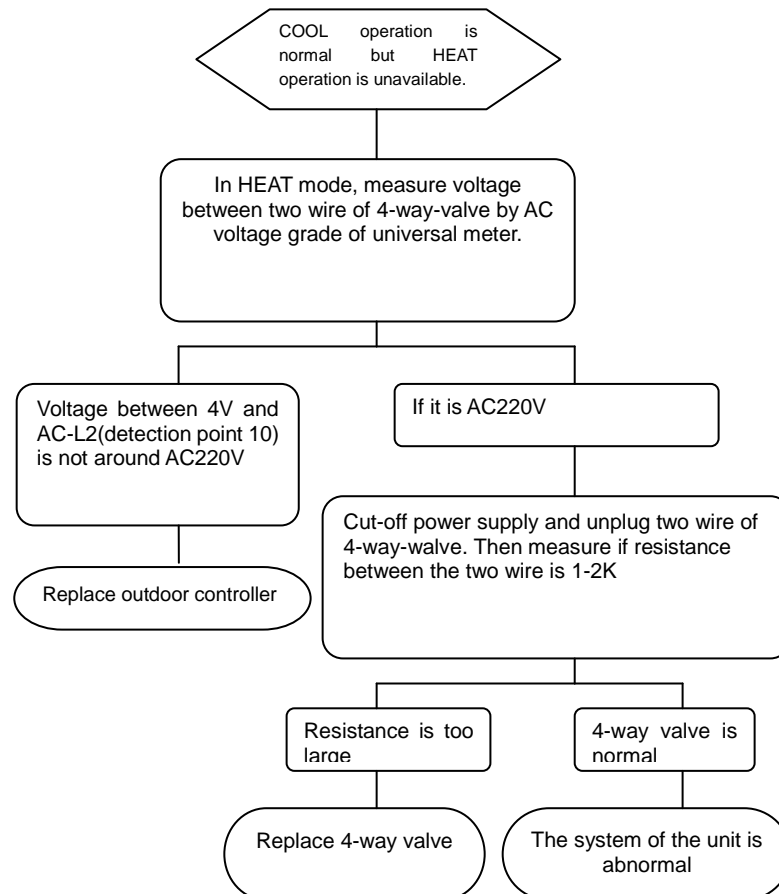
When $P_{cB} \geq 2000w$, the unit will operate at decreased frequency;

When $P_c \geq 2100w$, compressor stops operation.

Check if power of compressor meets the conditions mentioned above. Decrease the frequency so as to reduce the power to less than 1800w for 3min. Then check if the compressor resumes operation.

(20) Other Normal Malfunction

COOL operation is normal but HEAT operation is unavailable.



HEAT operation is normal but COOL operation is unavailable.

It is usually due to K3 contact adhesion of outdoor controller, which can be judged by universal meter.

After replacing outdoor controller, the malfunction still exists:

In that case, check if communication wire, temp sensor, fan, compressor or 4-way valve is normal.

Communication wire: Check if communication wire, live wire and neutral wire are incorrectly connected, or wiring terminal is poorly connected. If the communication wire is prolonged, check if the joint is well connected.

Temperature sensor: measure resistances to ground of the 3.3V(detection point 6) and IPM15V(detection point 3). If there is short circuit to ground, check if each temp sensor is damaged.

Electric reactor: If communication malfunction still occurs after replacing electric box, unplug 2 wiring terminals of electric reactor and measure resistance between these two terminals by universal meter.

Fan: unplug wiring terminal of fan and measure resistance between any two wire among red, yellow, white wire by universal meter. Usually, the resistance will be hundreds of ohm, otherwise, there is open circuit and the fan is damaged.

Compressor: If operation environment is good, wiring is correct and system is in normal conditions, the H5 protection still frequently occurs after replacing controller, probably because compressor has malfunction.

4-way valve: unplug two purple wire of 4-way valve and then measure if resistance between these two wire is 1~2K. If the resistance is too large, there is open circuit of electromagnetic valve and coil of 4-way valve shall be replaced.

If malfunctions above don't exist, inspect indoor unit.

(21) Cautions

1. Before replacing mainboard of inverter outdoor unit, check if the substituted mainboard is qualified. The following tests shall be done:
 - a. Check if there is short circuit between any two pins of IGBT. If so, this mainboard of outdoor unit can't be used.
 - b. Check if there is short circuit between P,N of DC bus bar. If so, this mainboard of outdoor unit can't be used.
 - c. Check if there is short circuit between P and U,V,W and between N and U,V,W. If there is any short circuit, this mainboard can't be used.
2. Each kind of compressor is applicable to one kind of mainboard. There is one-to-one relationship between mainboard and compressor. Before replacement, check the model of the mainboard which has malfunction and then use the mainboard with the same model for replacement. Don't judge model of mainboard according to model of the unit, or else, mismatching between mainboard and compressor may be incurred.
3. Before replacing compressor, chosen compressor which has the same model for replacement. Don't judge model of compressor according to model of the unit, or else, mismatching between compressor and pipeline or controller may be incurred.
4. Wire can't contact each other, 4-way valve, compressor and sharp edge. Ground wire of compressor, fan and electric box shall be separately fixed.

Appendix


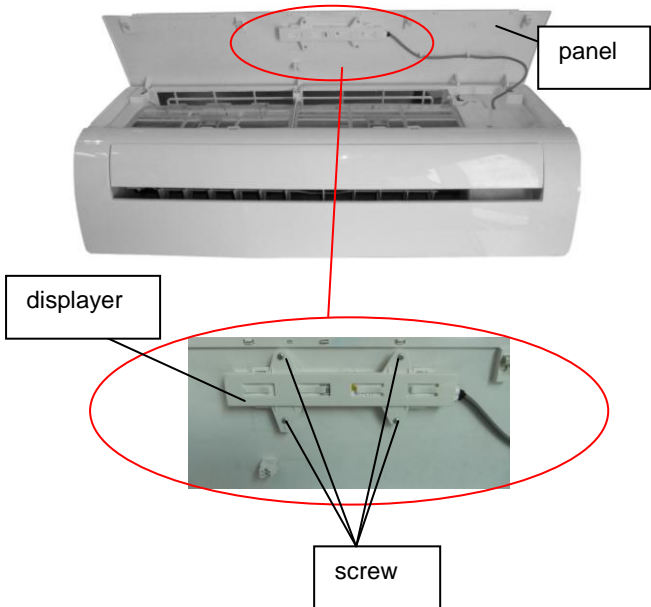
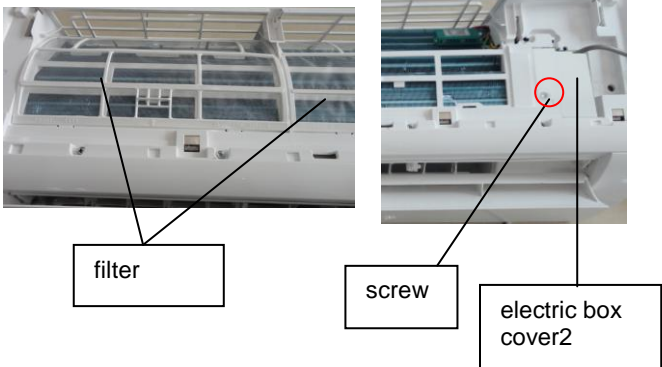
Appendix 1: Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units (15K)							
Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)
-19	138.1	20	18.75	59	3.848	98	1.071
-18	128.6	21	17.93	60	3.711	99	1.039
-17	121.6	22	17.14	61	3.579	100	1.009
-16	115	23	16.39	62	3.454	101	0.98
-15	108.7	24	15.68	63	3.333	102	0.952
-14	102.9	25	15	64	3.217	103	0.925
-13	97.4	26	14.36	65	3.105	104	0.898
-12	92.22	27	13.74	66	2.998	105	0.873
-11	87.35	28	13.16	67	2.896	106	0.848
-10	82.75	29	12.6	68	2.797	107	0.825
-9	78.43	30	12.07	69	2.702	108	0.802
-8	74.35	31	11.57	70	2.611	109	0.779
-7	70.5	32	11.09	71	2.523	110	0.758
-6	66.88	33	10.63	72	2.439	111	0.737
-5	63.46	34	10.2	73	2.358	112	0.717
-4	60.23	35	9.779	74	2.28	113	0.697
-3	57.18	36	9.382	75	2.206	114	0.678
-2	54.31	37	9.003	76	2.133	115	0.66
-1	51.59	38	8.642	77	2.064	116	0.642
0	49.02	39	8.297	78	1.997	117	0.625
1	46.6	40	7.967	79	1.933	118	0.608
2	44.31	41	7.653	80	1.871	119	0.592
3	42.14	42	7.352	81	1.811	120	0.577
4	40.09	43	7.065	82	1.754	121	0.561
5	38.15	44	6.791	83	1.699	122	0.547
6	36.32	45	6.529	84	1.645	123	0.532
7	34.58	46	6.278	85	1.594	124	0.519
8	32.94	47	6.038	86	1.544	125	0.505
9	31.38	48	5.809	87	1.497	126	0.492
10	29.9	49	5.589	88	1.451	127	0.48
11	28.51	50	5.379	89	1.408	128	0.467
12	27.18	51	5.197	90	1.363	129	0.456
13	25.92	52	4.986	91	1.322	130	0.444
14	24.73	53	4.802	92	1.282	131	0.433
15	23.6	54	4.625	93	1.244	132	0.422
16	22.53	55	4.456	94	1.207	133	0.412
17	21.51	56	4.294	95	1.171	134	0.401
18	20.54	57	4.139	96	1.136	135	0.391
19	19.63	58	3.99	97	1.103	136	0.382

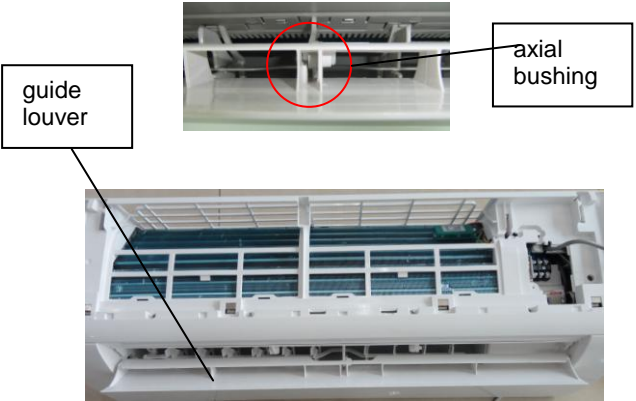
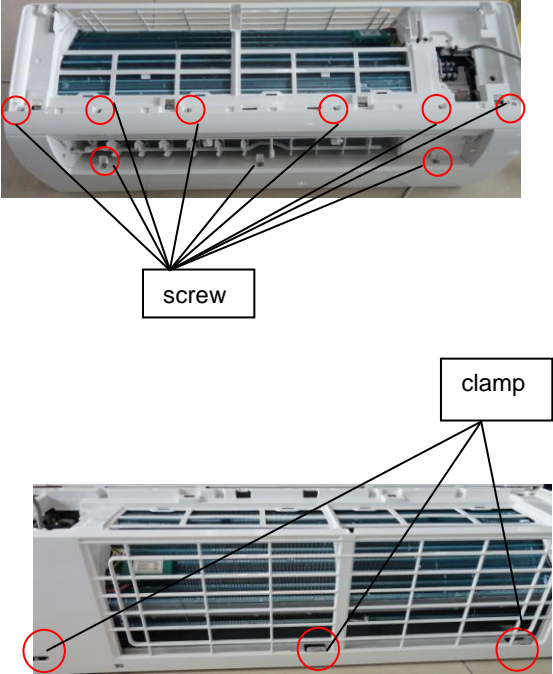
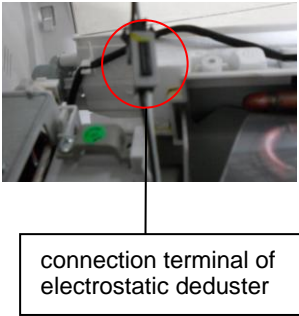
Appendix 2: Resistance Table of Outdoor and Indoor Tube Temperature Sensors (20K)							
Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)
-19	181.4	20	25.01	59	5.13	98	1.427
-18	171.4	21	23.9	60	4.948	99	1.386
-17	162.1	22	22.85	61	4.773	100	1.346
-16	153.3	23	21.85	62	4.605	101	1.307
-15	145	24	20.9	63	4.443	102	1.269
-14	137.2	25	20	64	4.289	103	1.233
-13	129.9	26	19.14	65	4.14	104	1.198
-12	123	27	18.13	66	3.998	105	1.164
-11	116.5	28	17.55	67	3.861	106	1.131
-10	110.3	29	16.8	68	3.729	107	1.099
-9	104.6	30	16.1	69	3.603	108	1.069
-8	99.13	31	15.43	70	3.481	109	1.039
-7	94	32	14.79	71	3.364	110	1.01
-6	89.17	33	14.18	72	3.252	111	0.983
-5	84.61	34	13.59	73	3.144	112	0.956
-4	80.31	35	13.04	74	3.04	113	0.93
-3	76.24	36	12.51	75	2.94	114	0.904
-2	72.41	37	12	76	2.844	115	0.88
-1	68.79	38	11.52	77	2.752	116	0.856
0	65.37	39	11.06	78	2.663	117	0.833
1	62.13	40	10.62	79	2.577	118	0.811
2	59.08	41	10.2	80	2.495	119	0.77
3	56.19	42	9.803	81	2.415	120	0.769
4	53.46	43	9.42	82	2.339	121	0.746
5	50.87	44	9.054	83	2.265	122	0.729
6	48.42	45	8.705	84	2.194	123	0.71
7	46.11	46	8.37	85	2.125	124	0.692
8	43.92	47	8.051	86	2.059	125	0.674
9	41.84	48	7.745	87	1.996	126	0.658
10	39.87	49	7.453	88	1.934	127	0.64
11	38.01	50	7.173	89	1.875	128	0.623
12	36.24	51	6.905	90	1.818	129	0.607
13	34.57	52	6.648	91	1.736	130	0.592
14	32.98	53	6.403	92	1.71	131	0.577
15	31.47	54	6.167	93	1.658	132	0.563
16	30.04	55	5.942	94	1.609	133	0.549
17	28.68	56	5.726	95	1.561	134	0.535
18	27.39	57	5.519	96	1.515	135	0.521
19	26.17	58	5.32	97	1.47	136	0.509

Appendix 3: Resistance Table of Outdoor Discharge Temperature Sensor (50K)							
Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)	Temp (°C)	Resistance (kΩ)
-29	853.5	10	98	49	18.34	88	4.754
-28	799.8	11	93.42	50	17.65	89	4.609
-27	750	12	89.07	51	16.99	90	4.469
-26	703.8	13	84.95	52	16.36	91	4.334
-25	660.8	14	81.05	53	15.75	92	4.204
-24	620.8	15	77.35	54	15.17	93	4.079
-23	580.6	16	73.83	55	14.62	94	3.958
-22	548.9	17	70.5	56	14.09	95	3.841
-21	516.6	18	67.34	57	13.58	96	3.728
-20	486.5	19	64.33	58	13.09	97	3.619
-19	458.3	20	61.48	59	12.62	98	3.514
-18	432	21	58.77	60	12.17	99	3.413
-17	407.4	22	56.19	61	11.74	100	3.315
-16	384.5	23	53.74	62	11.32	101	3.22
-15	362.9	24	51.41	63	10.93	102	3.129
-14	342.8	25	49.19	64	10.54	103	3.04
-13	323.9	26	47.08	65	10.18	104	2.955
-12	306.2	27	45.07	66	9.827	105	2.872
-11	289.6	28	43.16	67	9.489	106	2.792
-10	274	29	41.34	68	9.165	107	2.715
-9	259.3	30	39.61	69	8.854	108	2.64
-8	245.6	31	37.96	70	8.555	109	2.568
-7	232.6	32	36.38	71	8.268	110	2.498
-6	220.5	33	34.88	72	7.991	111	2.431
-5	209	34	33.45	73	7.726	112	2.365
-4	198.3	35	32.09	74	7.47	113	2.302
-3	199.1	36	30.79	75	7.224	114	2.241
-2	178.5	37	29.54	76	6.998	115	2.182
-1	169.5	38	28.36	77	6.761	116	2.124
0	161	39	27.23	78	6.542	117	2.069
1	153	40	26.15	79	6.331	118	2.015
2	145.4	41	25.11	80	6.129	119	1.963
3	138.3	42	24.13	81	5.933	120	1.912
4	131.5	43	23.19	82	5.746	121	1.863
5	125.1	44	22.29	83	5.565	122	1.816
6	119.1	45	21.43	84	5.39	123	1.77
7	113.4	46	20.6	85	5.222	124	1.725
8	108	47	19.81	86	5.06	125	1.682
9	102.8	48	19.06	87	4.904	126	1.64

10. Disassembly Procedure

Indoor disassembly:

Steps	Procedure
1. Before disassembly	
2. Remove panel	<p>Remove the clamps on left and right side of the panel, to separate the panel and front case. Remove the screws fixing display, to remove the display.</p> 
3. Remove filter and electric box cover 2	<p>Loosen the clamp of filter, pull outward to remove the filter; remove the two fixing screws on electric box cover, to remove the electric box cover 2</p> 

Steps	Procedure
<p>4. Remove guide louver</p>	<p>Pushing out the axial bushing in middle of the guide louver, slightly bend the guide louver to remove it.</p> 
<p>5. Remove front case assy</p>	<p>Remove the screws fixing front case. Loosen the clamps on front case.</p>  <p>Disconnect the connection terminal between electrostatic deduster and mainboard to remove the front case assy</p> 

6. Remove electric box assy

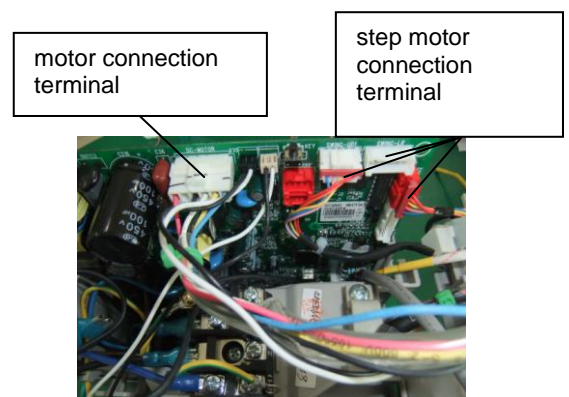
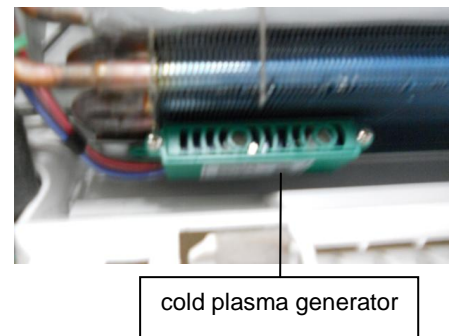
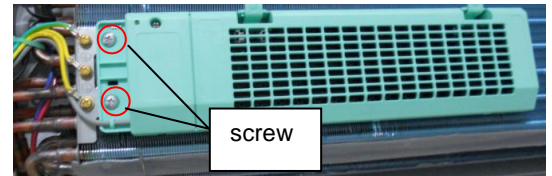
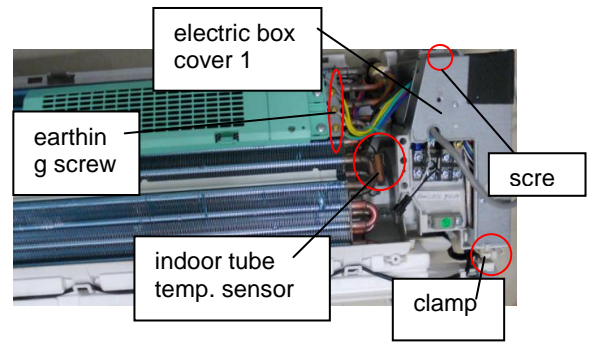
Loosen the clasp of electric box cover; remove the electric box cover; remove the tube temperature sensor; remove the 3 earthing wire screws of evaporator and then remove the connection screw of electric box and chassis.

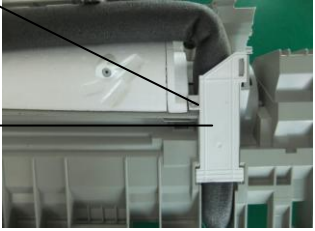
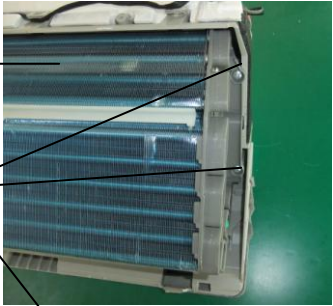

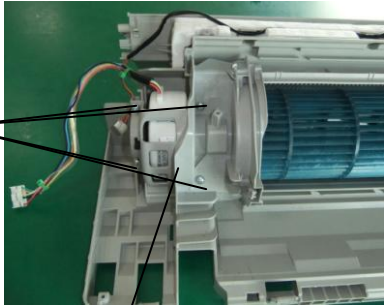
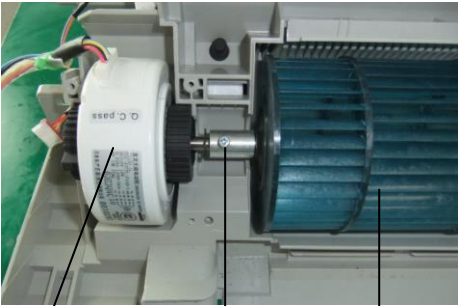
Remove the 2 connection screws of electrostatic deduster and evaporator and then remove the electrostatic deduster.

Remove the cold plasma generator from the evaporator; disconnect the connection wire of cold plasma generator and mainboard to remove the cold plasma generator.

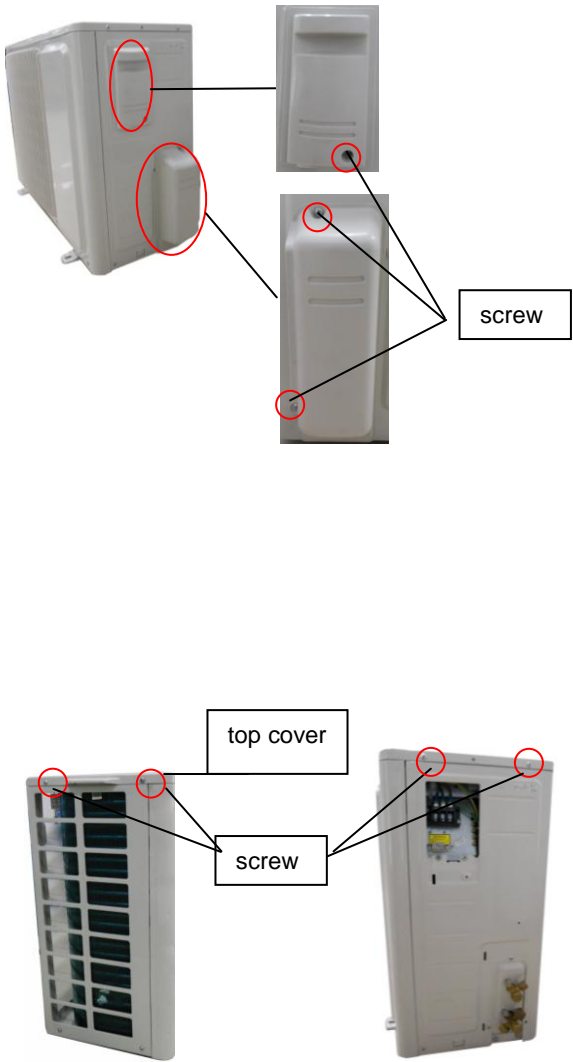
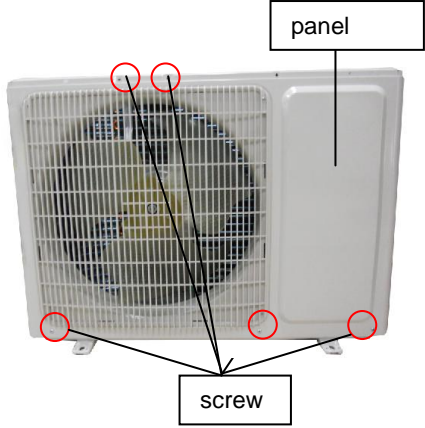
°

Disconnect each wiring terminal with mainboard to remove the electric box.



Steps	Procedure	
7. Remove connection pipe clamp and evaporator assy		<div data-bbox="1034 197 1145 248">screw</div> <div data-bbox="932 322 1129 405">connection pipe clamp</div> <div data-bbox="1157 219 1473 448"></div> <div data-bbox="959 510 1114 593">evaporator assy</div> <div data-bbox="975 645 1086 696">screw</div> <div data-bbox="1142 488 1476 792"></div> <div data-bbox="975 1010 1086 1061">clamp</div> <div data-bbox="1114 840 1497 1144"></div>
8. Remove motor clamp		<div data-bbox="948 1317 1059 1368">screw</div> <div data-bbox="1107 1214 1493 1518"></div> <div data-bbox="1129 1547 1313 1599">motor clamp</div>
Steps	Procedure	
9. Remove motor and cross fan blade		<div data-bbox="975 1671 1436 1975"></div> <div data-bbox="975 2004 1086 2056">motor</div> <div data-bbox="1134 2004 1246 2056">screw</div> <div data-bbox="1283 2004 1513 2056">cross fan blade</div>

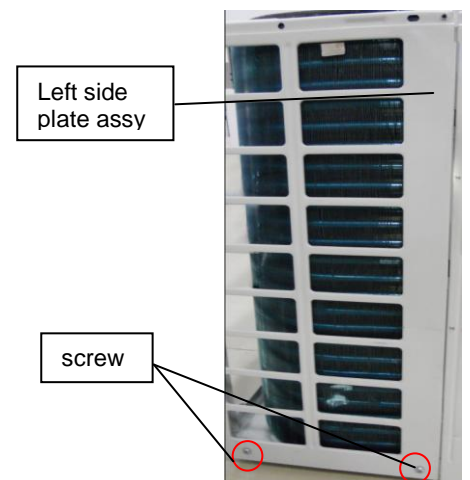
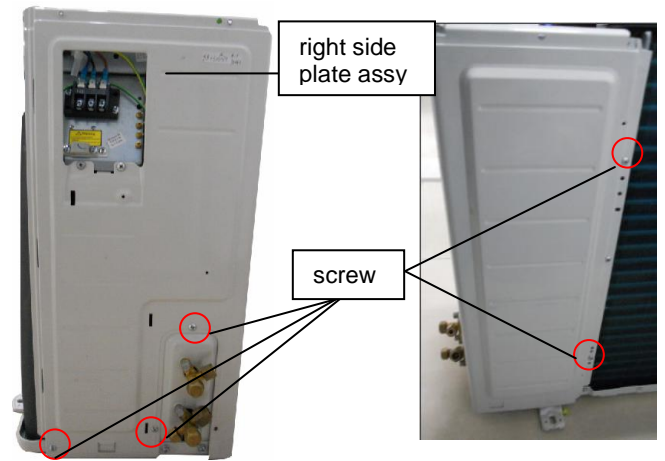
Outdoor disassembly:

Steps	Procedure
<p>1. Remove top cover</p> <p>Remove the screws fixing right handle and valve cover, to remove them.</p> <p>Remove the screws fixing left & right side of top cover, to remove the top cover.</p>	 <p>The diagram illustrates the removal of the top cover in two steps. The first step shows the top cover being detached from the main unit, with red circles highlighting the screws. The second step shows the top cover being removed from the side of the unit, with red circles highlighting the screws. Labels 'screw' and 'top cover' are present.</p>
<p>2. Remove panel assy</p> <p>Remove the screws connecting panel assy, chassis and motor support, to remove the panel assy.</p>	 <p>The diagram illustrates the removal of the panel assembly. The panel is shown being detached from the main unit, with red circles highlighting the screws. Labels 'panel' and 'screw' are present.</p>

3. Remove left and right side plate assy

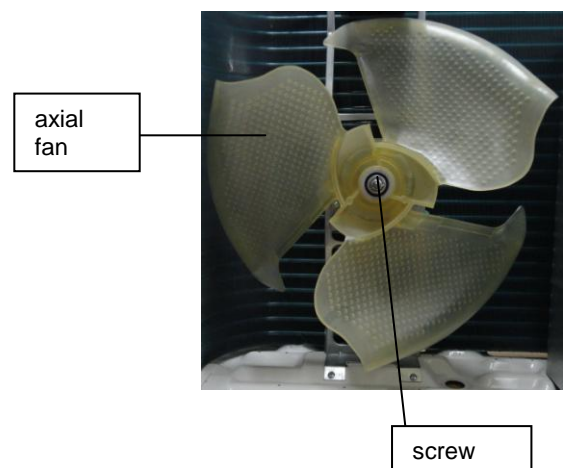
Remove the screws connecting right side plate and evaporator, electric box assy and valve support, to remove the right side plate assy.

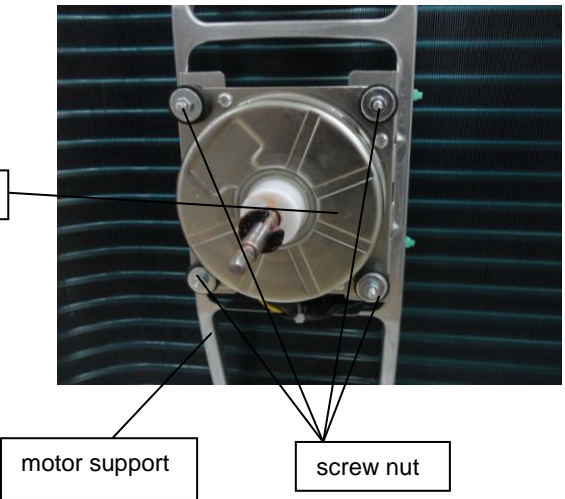
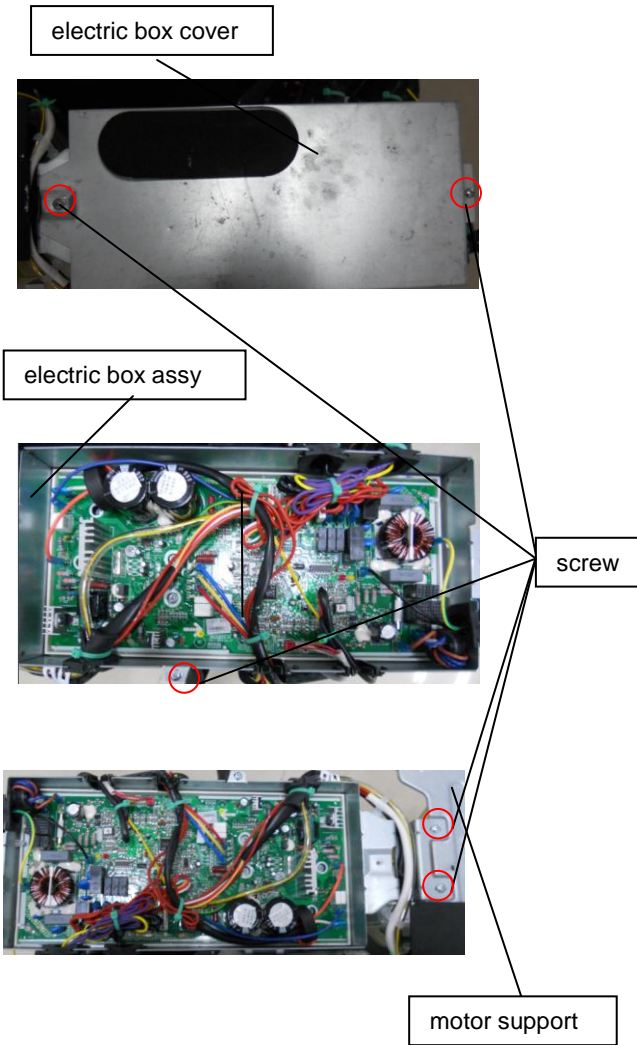
Remove the screws connecting left side plate and evaporator to remove the left side plate assy.

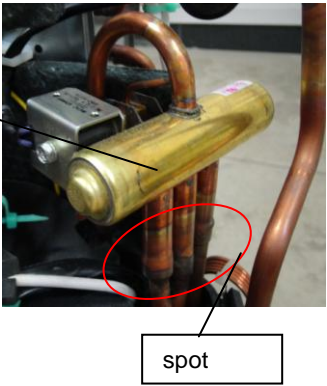
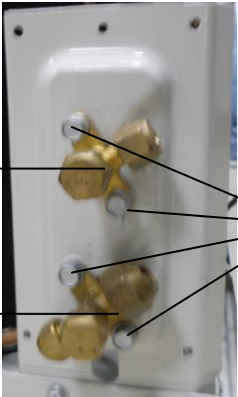



4. Remove axial fan blade

Remove the screw nut fixing axial fan blade, to remove the axial fan blade



<p>5. Remove motor and motor support</p> <p>Remove the screw nut fixing motor, to remove the motor; remove the screws connecting motor support and chassis, to remove the motor support.</p>	 <p>motor</p> <p>motor support</p> <p>screw nut</p>
<p>6. Remove electric box assy</p> <p>Remove the screw fixing electric box cover, to remove the electric box cover.</p> <p>Cut off the bonding tie, pull out every connection terminal, remove every connection wire along the wire distributing, to separate the connection wire and electric box.</p> <p>Remove the screws connecting electric box assy, mid-isolation board and motor support, to remove the electric box assy.</p>	 <p>electric box cover</p> <p>electric box assy</p> <p>screw</p> <p>motor support</p>

Steps	Procedure	
7. Remove four-way valve assy		
	<p>Remove the screw on electromagnetic loop, to remove the loop. Welding cut the spot weld of four-way valve, to remove the four-way valve assy. (Release the refrigerant clearly before welding cutting)</p>	 <p>four-way valve</p> <p>spot</p>
8. Remove big and small valve		
	<p>Remove the screw fixing big and small valve, to remove the valves.</p>	 <p>small</p> <p>big valve</p> <p>screw</p>
9. Remove compressor		
	<p>Remove the sound insulation cotton packing compressor, remove the feet screw nut fixing compressor, to remove the compressor.</p>	 <p>compressor</p> <p>sound insulation</p> <p>feet screw</p>